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COMBINATIONS AND VARIATIONS OF TECHNIQUES FOR IMPROVED CHROMOSOME STUDIES IN THE GRAMINEAE

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(With Plate I)

Cytologists today emphasise the superiority of the squash method over the microtome technique for the study of chromosomes in most species of plants. In general, however, a certain amount of difficulty is experienced in obtaining good somatic metaphase plates from the root tips of grasses and cereals. The root tips are hard and difficult to squash due to the failure of the cells to separate readily from one another, even after prolonged hydrolysis in N.HC1, or repeated heating in the acetic stains.

By combining various methods and techniques it has been possible to obtain rather good results for chromosomal investigations in all the species of pasture grasses and cereals tested by the author.

Pretreatment Before Fixation.

Many plant species especially the *Gramineae* have fairly large chromosome numbers. In order to make accurate counts and morphological studies it has been found necessary to contract the chromosomes and scatter them over a larger cell area than the normal metaphase plate. Amongst the first chemicals tried was chloral hydrate (Kagawa, 1929). With the discovery in 1937 by Blakeslee and Avery, and Nebel and Ruttle, that colchicine induces polyploidy in plants, it was shown that this organic substance inhibits spindle formation. contracts the chromosomes and in a large number of plant species causes a scattering of the chromosomes within the cell. O'Mara (1939) recommended the use of colchicine for the studies of grass chromosome morphology. In many grasses, however, colchicine caused a clumping of the chromosomes. Later investigations led to the discovery of a number of treatments which produced effects similar to that of colchicine. Swanson (1940) used acenaphthene. Östergren (1944) described a number of c-metaphase inducing substances. Meyer (1945) gave a paradichlorobenzene treatment. and Hill and Myers (1945) a cold treatment for 24 hours to facilitate chromosome counting. O'Mara (1948) made an extensive study of a large number of organic compounds and recommended the use of monobromonaphthalene and monobromobenzene for metaphase and 3 per cent methanol treatment for prophase chromosome studies in Zea. Tjio and Levan (1950) preferred oxyquinoline, and Caroli (1952) oxyquinoline derivatives.

During the present study it was found that the majority of cereals and grasses responded very well to either colchicine or monobromonapthalene pretreatment or both. In most cereals the results were equally good—a 0.05 per cent colchicine solution acting quicker than a saturated aqueous solution of monobromonaphthalene. For maximum chromosome contraction, in order to facilitate their counting, the optimum periods of pretreatment at 20° to 25°C were 3 hours with the former and 3½ to 4 hours with the latter. These two compounds were preferred to oxyquinoline—although Tjio and Levan (1950) claim that it reveals the structure of the centomere and secondary constrictions much better—because it caused a fuzzy chromosome contour. According to Bhaduri and Ghosh (1954), who likewise preferred the use of monobromonaphthalene, the introduction of oxyquinoline to the fixative had an effect similar to the oxyquinoline pretreatment in exaggerating the centromeres and secondary constrictions. The presence of oxyquinoline in the fixative has the disadvantage that it produces a suspension of dark staining fatty particles in the tissues (Bhaduri and Ghosh, 1954).

FIXATION.

The acetic acid fixatives (Carnoy and modifications) are widely used because they are inexpensive, easy to use. penetrate quickly, fix rapidly. do not stain the cytoplasm and to a certain extent dissolve the middle lamella. Root tips are often more readily squashable, especially after the Feulgen staining schedule. However, in the *Gramineae* the chromosomes were very often badly fixed in these fixatives, having a "bubbly" appearance and fuzzy outlines obscuring the clarity of the centromeres and secondary constrictions. They frequently also caused a certain amount of chromosome stickiness. Furthermore they did not harden and coagulate the cytoplasm sufficiently, so that especially after hydrolysis in N.HCl, the tapping and squashing of the root tips to separate the tenaceously bound cells, caused them to break so that bits of cytoplasm with some chromosomes floated away. Similar results were obtained when using the methyl alcohol-acetic acid fixative of O'Mara (1948), ethyl alcohol-propionic acid combinations (cf. Johansen, 1940; Sparrow and Sparrow, 1949), and methyl alcohol-propionic acid mixtures with and without chloroform. (However, in some Liliaceous plants, e.g. *Ornithogalum*, mixtures consisting of 6 parts methyl alcohol : 3 chloroform : 2 propionic acid, or 3 methyl alcohol : 2 propionic acid gave results far superior to 3 : 1 or 6 : 3 : 1 Carnoy).

The osmic and Navashin fixatives, without further chemical treatment, were rather useless for squash preparations in most *Gramineae.* Not only were the root tips harder and the cells more tenaceously bound together, but they also caused staining and severe granulatory coagulation of the cytoplasm, which greatly reduced the chromosome contrast. This is a great pity, since these, especially the osmic fixatives, are generally the best for chromosome fixation (cf. La Cour, 1947). Flovik (1938) has convincingly shown that La Cour's 2BD fixative produced the best chromosome fixation when studied in microtomed sections. Bhaduri and Ghosh (1954) similarly recommended osmic Benda.

In order to prevent excessive hardening and blackening, La Cour (1953) advised that after 1 hour fixation in 2BD, an equal volume of 1 per cent chromic acid in distilled water should be added to the fixative. The root tips are to remain in this mixture overnight, and are then thoroughly washed in distilled water.

La Cour (1947) bleached the stained roots in a mixture consisting of 1 part 20 vol. hydrogen peroxide and 3 parts 80 per cent alcohol for 3 to 6 hours. Bhaduri and Ghosh (1954) washed the root tips in dilute sulphuric acid, and during dehydration treated the preparation with a 1 : 1 mixture of redistilled turpentine and n-butyl alcohol.

MACERATION.

A number of different treatments have been suggested to improve cell separation without influencing the staining capacity of the chromosomes. The majority of these were directed at the breakdown and dissolution of the pectinaceous middle lamella: others were used to digest the cellulose cell wall.

Hillary (1939) recommended a 15 min. treatment at 60°C in 4 per cent (by volume) NH_4OH, or 40 min. in 4 per cent ammonium oxalate at 60°C to break the pectic salts of the middle lamella down to soluble pectate, which can be removed by washing. Fabergé (1945) gave an overnight treatment with snail stomach fluid, containing an active mixture of cytase, to dissolve the cell walls of the root tips. McKay and Clarke (1946) used a 1 per cent solution of "Pectinol", obtained from *Aspergillus*, with success. Hohl (1948), in order to macerate soft plant parts, treated the tissues with a 1 to 5 per cent solution of the proprietary enzyme, "Pectinol W", made by Rohm and Haas, buffered to pH 5·0 with acetic acid. After deaeration in an aspirator the tissues remained in the solution for 15 to 24 hours at 28° to 30°C. Pectic enzymes derived from various *Aspergillus* and *Penicillium* species were also used with great success. After a 24 hour extraction period and filtration, a 5 per cent solution of another commercial enzyme complex, "Filtragol", made by Bayer Leverkussen, containing a large percentage of pectinase, was used for 3 hours by Bauch and Overbeck (1949). Although a pH 6·0 was regarded optimal for the enzyme, the solution was not buffered since the root tips were considered sufficiently acid after fixation. Chayen (1949) similarly used a pectic enzyme derived from *Penicillium digitatum*, but since the maceration potencies of different samples varied, Chayen and Miles (1954) preferred the use of the standardised commercial enzyme, "Pectinase", made by Nutritional Biochemical Corp., Cleveland, Ohio. To inhibit the proteolitic enzymes, a 5 per cent solution (by weight) of the powder was extracted in a 1 per cent aqueous solution of peptone. Maceration for 1 hour in this solution was sufficient for material fixed in acetic-alcohol. Harris and Blackman (1954) treated the root tips for 12 hours in a 2 per cent "Pectinase" solution adjusted to pH 6.6. Ford (1952) gave a treatment of ammonium oxalate-hydrogen peroxide after osmic fixation to bleach the cytoplasm and dissolve the middle lamella.

With all the *Gramineae* investigated by the present author, a solution of pectinase was found to be most suitable for macerating root tips. A commercial cytase preparation tried, adversely affected the Feulgen staining. The pectinase solution was prepared by extracting 0.1 gm. of the commercial "Pectinase" (Nutritional Biochemical Corp., Cleveland, Ohio) in 10 c.c. distilled water or 1 per cent peptone, for at least 30 min. at 30°C. and filtering. Excellent pectinase solutions can also be prepared by extracting pectic bran on which *Aspergillus niger* was cultivated—0.5 gm. bran per 10 c.c. distilled water. It was not found necessary to adjust the pH, but this would probably be advantageous. In order to control microbial contamination Harris and Blackman (1954) added toluene to the enzyme preparation, but Hohl (1948) found that 0.05 to 0.1 per cent merthiolate was more effective.

The enzyme treatment for complete separation of the cells at 30°C. was about 18 hours after Carnoy fixation, 24 hours after 2BD fixation, and even longer after Navashin fixation. By using stronger enzyme concentrations, the optimum pH, and deaeration, the treatment can be shortened. Excellent maceration were achieved in this way after all fixatives. By gently tapping the root tip with the flattened back of a bone needle the cells fall apart while the contents of each cell remains intact. However, as previously mentioned the cytoplasm was too dark and granular after osmic and Navashin fixation to allow any critical chromosome observations when Feulgen squash preparations were made. After Carnoy fixation the staining was intense and the cytoplasm clear; the drawback here was the poor fixation of the chromosomes, and the softness of the cytoplasm after digestion. With some species, however, very good results could be obtained.

The ammonium oxalate-hydrogen peroxide technique (Ford, 1952) was found very useful in many plant species after 2BD and Benda osmic fixatives for clearing the cytoplasm and macerating the root tips. In most of the *Gramineae* a treatment of up to 15 min. at about 20°C was not sufficient to produce satisfactory separation of the cells. Prolonged treatment softened the tissue too much and severely reduced the stainability of the chromosomes.

A combination of the ammonium oxalate-hydrogen peroxide and pectinase treatments in the end proved to be the most satisfactory. After 2BD, Benda and Navashin fixation, and the Feulgen staining method, excellent separation of the cells, clear cytoplasm and well fixed, intensely stained chromosomes were obtained. Furthermore the pectinase treatment period was very much reduced.

After fixation the root tips were thoroughly washed in distilled water, and treated for 10 min. in a 1 : 1 mixture of saturated ammonium oxalate in distilled water and 20 vol. hydrogen peroxide. Although the 1 per cent pectinase treatment can also be given after staining, it is generally given prior to hydrolysis. According to the species involved the middle lamella pectin was adequately broken down after 8 to 12 hours at room temperature, or 5 to 7 hours at 30°C.

The advantage of this method is that single whole cells at the metaphase stage can readily be obtained (Plate 1a–d), the chromosomes of which can be further spread apart, if necessary, by applying slight pressure on the coverslip overhead between two thicknesses of blotting paper, and very gently heating the slide over a spirit flame.

To summarise, the following schedule has been used for the critical investigation of the chromosomes from seedling root tips of various species of grasses and cereals:

(1) Germinate the seeds between sterile, well soaked, thick filter paper. When the roots have reached a length of 0·25 to 0·5 cm. place the seedlings between damp filter paper for 1 or 2 days at 25°C.

(2) Cut off the roots about 1 cm. from the tip and place these in small glass vials containing a saturated aqueous solution of monobromonaphthalene, or a 0.05 per cent colchicine solution. The best time to start the pretreatment is between 9.00 and 11.00 a.m.

(3) After 3½ to 4 hours in the monobromonaphthalene, or 3 hours in the colchicine solution at 25°C., fix the roots in La Cour's 2BD fixative for 1 hour.

(4) Add an equal quantity of 1 per cent chromic acid in distilled water to the fixative and leave overnight.

(5) Rinse the roots thoroughly in distilled water and leave in distilled water for 30 min. (Change the distilled water every 5 to 10 minutes).

(5a) Store in 70 per cent alcohol if necessary.

(6) Decant the distilled water and place the roots in a mixture consisting of 1 part saturated aqueous solution of ammonium oxalate and 1 part 20 vol. (=6%) hydrogen peroxide for 10 min. in strong light in order to bleach and for preliminary maceration.

(7) Wash the roots thoroughly in distilled water (5 changes over a 30 min. period will suffice).

(8) Place the roots in the macerating enzyme solution (0.1 to 0.5 gm. "Pectinase" is added to 10 ml. distilled water or 1 per cent peptone, extracted for at least 30 min. at 30°C. and filtered. Buffer the solution to pH 6.0 with acetic acid, and add toluene or 0.005 to 0.01 gm. merthiolate crystals). Deaerate if necessary. Allow the enzyme to digest for 5 to 7 hours at 30°C. or 8 to 12 hours at room temperature.

(9) Rinse the roots in water.

(10) Hydrolose the roots in N.HCl at 60°C. for 12 to 15 min.

(11) Stain in Leuco-basic-fuchsin (as prepared by La Cour, 1947) for 2 to 3 hours.

(11a) If necessary intensify the colouration by washing the roots in tap water for 5 to 30 min.

(12) Cut off the meristematic root tip in a drop of 45 per cent acetic acid or aceto-carmine and gently tap the tissue with the flattened handle of a bone or plastic needle until the cells are well separated.

(13) Cover with an albuminised cover slip and gently give a few more taps. Examine under the microscope, and after locating the cells

at the required stage, apply slight pressure on the cover slip between two thicknesses of blotting paper to flatten the cells and scatter the chromosomes. Warm the slide very gently if necessary—too much heat can spoil the whole preparation.

(14) To make the preparation permanent, separate the slide and cover slip by inverting the slide in a ridged dish containing 45 per cent acetic acid.

(15) Pass the cover slip through the following series, remaining 1 to 2 minutes in each: 60 per cent alcohol plus a few drops of acetic acid; 80 per cent alcohol, 95 per cent alcohol; absolute alcohol; 1 absolute alcohol: 1 Euparal essence (can be omitted).

(16) Recombine the slide and cover slip by mounting in Euparal.

NOTE ON P.M.C. FIXATION.

During his investigation of *Ornithogalum* (*Liliaceae*) the author had difficulty with "bubbly" fixation of the chromosomes, and stickiness of both chromosomes and P.M.C.'s when the ordinary acetic fixatives were used. A modification of O'Mara's (1948) methyl alcohol fixative was tried and was found to be far superior. This fixative was later also used on grass and cereal P.M.C.'s with gratifying results (Plate 1 e–h). The bivalents were well fixed, the propionic or aceto-carmine (or a mixture of the two) staining was intense, the tendency of the P.M.C's to stick together was greatly reduced and the elasticity of the cytoplasm was such that it could be pressed out of the cell wall without breaking apart or losing its circular shape.

The fixative consists of 6 parts methyl alcohol: 3 parts chloroform: 2 parts propionic acid with a trace of ferric chloride added. Fix for 24 hours and store either in the fixative or preferably in 70 per cent alcohol in a refrigerator. Best squashing results are obtained after a 4-day storage period. With some material the chloroform can be omitted. Preparations are made permanent as described in the above schedule.

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The author takes pleasure in thanking Mr. L. F. La Cour, John Innes Horticultural Institution, for his helpful advice and criticisms.

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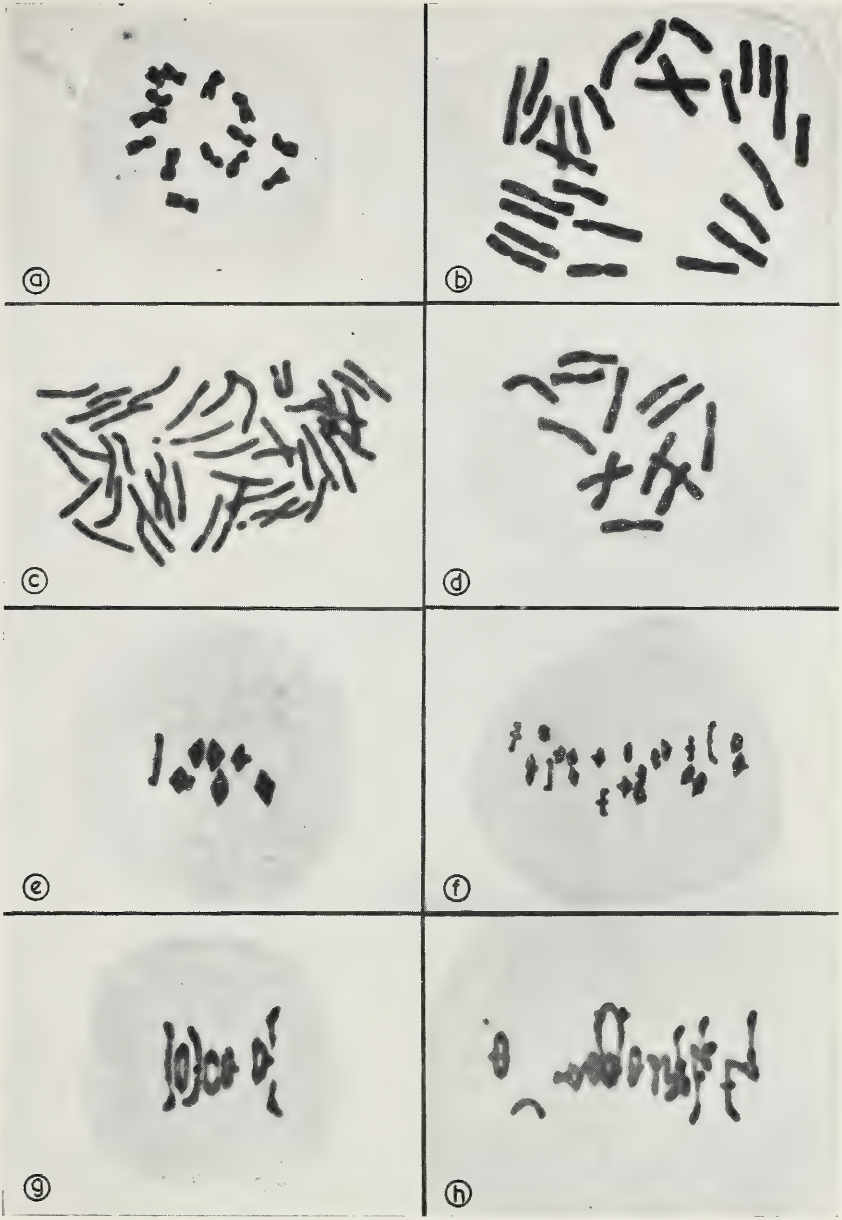

PLATE 1: Photomicrographs of Feulgen (a—d) and aceto- and propionic-carmine (e—h) preparations. The photomicrographs were taken with a Carl Zeiss, Jena, microscope and Zeiss Winkel attachment camera to which a Leica camera was fitted, on Kodak Microfile film which was developed in Kodak D.158 developer for 3 minutes at 20°C. and fixed in "Amfix", made by May and Baker Ltd., for 2 min. Figs. *a* and *b* were taken from temporary preparations whereas figs. *c* to *h* were taken from permanent preparations.

(*a*) *Pennisetum glaucum* root tip chromosomes, x 1645.
(*b*) *Agropyron distichum* root tip chromosomes, x 1645.
(*c*) *Triticum vulgare* root tip chromosomes, x 1645.
(*d*) *Secale cereale* root tip chromosomes, x 1645.
(*e*) *Festuca elatior* P.M.C. at MI, x 1000.
(*f*) *Festuca arundinacea* P.M.C. at MI, x 725.
(*g*) *Secale cereale* (diploid) P.M.C. at MI, x 847.
(*h*) *Secale cereale* (pentasomic tetraploid) P.M.C. at MI, x 847.

THE SPECIES OF *POLYGALA* IN THE SOUTH-WESTERN CAPE PROVINCE

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(*University of Cape Town.*)

Work on the *Polygalaceae* of temperate South Africa was started in 1947. At the outset all three genera, *Polygala*, *Muraltia* and *Mundia*, were included in the proposed research. However, it soon became evident that concentration on the single endemic genus *Muraltia* was essential for solution of the numerous problems presented by that baffling genus. Although attention was no longer focussed on *Polygala*, field work was continued. Even at that early stage of the work it was apparent that a considerable range of variation existed in some of the more widespread species, and particular attention was paid to geographical differences within the species. On completion of the study of *Muraltia*, it seemed desirable to put on record some of the observations made on *Polygala* and the present paper is the outcome of that decision.

Polygala is widely distributed in most parts of the world and in Africa south of the Sahara over two hundred species have been recorded. As the author has no first hand knowledge of most of these species, it was decided to confine the present study to species occurring in the main region of the Cape Flora. An arbitrary line drawn through the eastern boundaries of the Divisions of George and Oudtshoorn is taken as the eastern limit and only those species which have the whole or part of their area of distribution to the west of the George-Oudtshoorn line, are included in the following account. The number of such species is twenty-six. No attempt is made to produce a complete monograph even of this small number of species. Not all the type specimens have been seen and although the author has been able to clear up some problems of nomenclature, more remains to be done by future workers on the genus. All that is attempted here is to place on record observations made during the last eight years and to give the synonomy of each species as far as is possible with the data available to the author in South Africa.

For reasons given in a paper on geographical distribution, to be published in a forthcoming part of the *Transactions of the Royal Society of South Africa*, *Polygala* is not regarded as a true member of the Cape Flora though several species are conspicuous constituents of the sclerophyll. Certain species with limited areas of distribution have almost certainly originated within the Cape area, but the genus as a whole has not the characteristics of that ancient flora which has its headquarters at the present time in the area of winter rainfall.

When preparing the *Polygalaceae* for the Flora of the Cape Peninsula, it was apparent that several specific names had been wrongly applied. The late Dr. H. G. Fourcade, who was interested in the flora of Humansdorp and the neighbouring Divisions, assured me that muddled nomenclature was equally prevalent in the Polygalas of his area. That he was right in this is fully borne out by the present research. In the following account, discussions on nomenclature are given under those species about the identity of which mistakes have been made in the past.

The illustrations which accompany this paper are somewhat diagrammatic though all have been drawn to scale. They are intended as an aid to diagnosis and are complementary to the shortened descriptions. The leaves are shown lying with the under surface uppermost. The inner left-hand sepal is depicted with its outer surface uppermost. The left-hand side petal is depicted in the same way and flattened as much as possible. In two cases, owing to the pronounced overlapping of the side petals and their consequent curvature, it has been necessary to give additional drawings. Both the side petals and the carina are adnate in their lower parts to the staminal tube. Separation can usually be effected but it may be accompanied by slight tearing of the tissues. In all cases drawings have been made after separation from the stamens.

The initial stages of the research were carried out while the author was holding a Senior Bursary awarded by the Council for Scientific and Industrial Research. A grant covering travelling expenses was also made available. The work was carried out in the Botanical Department of the University of Cape Town and in the Bolus Herbarium. The author wishes to record her gratitude for all these facilities.

As on many previous occasions, thanks are due to Captain T. M. Salter for checking the Latin diagnoses.

KEY TO THE SPECIES.

1. Leaves opposite .. .. 1. *fruticosa*.
1. Leaves alternate.
  2. Inflorescence lateral, the peduncle more or less at right angles to the stem.
    3. The outer sepals glabrous outside, sometimes ciliate.
      4. Leaves distinctly revolute.
        5. Habit decumbent: side petals with a small tooth-like outgrowth between the main lobes: young stems glabrous or scabrous .. .. 5. *peduncularis*.
        5. Habit erect or almost so: side petals without a tooth-like outgrowth between the lobes: young stems shortly woolly .. .. 3. *teretifolia*.
      4. Leaves not distinctly revolute.
        6. Crest penicillate, most segments free for at least three-quarters of their length.

7. Flowers small, the inner sepals 7 mm. long or less: leaves very small and distant.

8. Crest in profile about as long as the limb of the carina: stigma terminal on its branch 26. *nematocaulis.*

8. Crest in profile much shorter than the limb of the carina: stigma along the lower edge of the style branch .. .. 25. *pappeana.*

7. Flowers larger, the inner sepals 9 mm. long or more: leaves well developed .. .. 24. *refracta.*

6. Crest not penicillate, entire or lobed for a short distance only.

9. Side petals entire or very shortly lobed: the stigma terminal on its branch.

10. Crest as seen in profile much smaller than the limb of the carina: the anterior style branch standing obliquely to the style .. 22. *ludwigiana.*

10. Crest in profile about as large as the limb of the carina: the anterior style branch erect, continuing the line of the style .. 23. *parkeri.*

9. Side petals distinctly and unequally bilobed: the stigma along the lower edge of the style branch .. .. 21. *lehmanniana.*

3. The outer sepals hairy outside.

11. Side petals shortly and more or less equally bilobed 19. *affinis.*

11. Side petals deeply and unequally bilobed.

12. Crest inconspicuously lobed, the segments less than half the length of the crest .. .. 20. *brachyphylla.*

12. Crest penicillate, consisting of a number of long narrow segments .. .. 4. *lasiosepala.*

2. Inflorescence usually terminal, occasionally with a few lateral inflorescences as well or with the inflorescence becoming intercalary through vegetative growth of the terminal bud.

13. Side petals bilobed, the anterior lobe longer than or as long as the posterior.

14. Crest meagre, consisting of few narrow segments 7. *microlopha.*

14. Crest ample, penicillate.

15. Sepals hairy .. .. 4. *lasiosepala.*

15. Sepals glabrous.

16. Erect woody much branched shrubs .. 2. *myrtifolia.*

16. Plant not as above.

17. Leaves flat: the anterior lobe of the side petal longer than the posterior 6. *bracteolata.*

17. Leaves revolute: the anterior and posterior lobes of the side petals not very different in length .. .. 5. *peduncularis.*

13. Side petals entire or bilobed, when lobed the anterior lobe shorter than the posterior.

18. Lateral petals deeply bilobed, the posterior lobe longer and broader than the anterior .. .. 3. *teretifolia.*

18. Lateral petals not as above.

19. Leaves hairy at any rate on the lower surface.

20. Side petals more or less equally bilobed, about as long as the carina with the crest excluded .. .. 14. *pubiflora.*

20. Side petals unequally bilobed or almost entire, much shorter than the carina with the crest excluded.

21. Ovary and capsule with hairs along the edge .. .. 18. *dasyphylla.*

21. Ovary and capsule wholly glabrous 8. *wittebergensis.*

19. Leaves not hairy on the lower surface.

22. Inflorescence an elongated raceme: the style, below its branches, without a sharp bend near the middle . . . . . . 12. *garcini.*

22. Inflorescence umbellate or nearly so: the style below its branches, sharply bent near the middle.

- 23. Stigma terminal on the style branch or nearly so.
  - 24. Stems sharply triangular in section . . . . 13. *triquetra.*
  - *24.* Stems not as above.
    - 25. Crest ample, penicillate, the segments free for the greater part of their length.
      - 26. Outer sepals ciliate, somewhat obtuse . . 10. *pottebergensis.*
      - *26.* Outer sepals non-ciliate, acute . . . . . . 16. *meridionalis.*
    - *25.* Crest not penicillate, the segments united for at least one-third of their length . . 11. *recognita.*
- *23.* Stigma along the lower edge of the style branch.
  - 27. Inner sepals 12 mm. long or more.
    - 28. Anterior lobe of the side petal separated from the posterior by a wide depression . . . . 2. *myrtifolia.*
    - *28.* Lobes of the side petal not as above . . . . . . 17. *langebergensis.*
  - *27.* Inner sepals less than 12 mm. long.
    - 29. Side petals with a small lobe on the anterior side, glabrous outside.
      - 30. Average length of the leaf 10 mm. or less: the inner sepals 10 mm. long or less . . . . . . 15. *ericaefolia.*
      - *30.* Average length of the leaf much more than 10 mm. long: the inner sepals 11 mm. long or more . . . . . . 17. *langebergensis.*
    - *29.* Side petals without a small anterior lobe, with a hairy patch outside near the base on the posterior side.
      - 31. Branches not confined to the base of the plant: older plants woody throughout: side petals more or less oblong when flattened . . . . 8. *wittebergensis.*
      - *31.* Branches almost confined to the base of the plant: older plants woody at the base only: side petals when flattened not oblong, widest near the middle . . . . . . 9. *umbellata.*

1. **Polygala fruticosa** Berg. Descr. Pl. Cap. 183 (1767). *P. oppositifolia* L. Mant. alt. 259 (1771): Ker. Bot. Reg. t. 636 (1822): DC. Prod. I p. 321 (1824): Harvey in Harv. & Sond, Fl. Cap. I. 82 (1859–60). *P. cordifolia* Thunb. Prod. 120 (1800). *P. latifolia* Ker. Bot. Reg. t. 645 (1822). *P. tetragona* DC. l. c. 322. *P. nummularia* DC. l. c. 322. *P. borboniaefolia* DC. l. c. 322. *P. rhombifolia* E. & Z. Enum. Pl. 18 (1834). *P. meyeriana* Presl Bot. Bemerk. 14 (1844). *P. dregeana* Presl l. c. 14. *P. macrantha* Turcz. Bull. Soc. Nat. Mosc. 27, 345 (1854). (Fig. 1, A–V.)

A branched shrub, usually erect, from 30 cm. to 2 m. high, glabrous or pubescent, the stems rounded or angled. *Leaves* opposite, 8·0—40·0 mm. long, usually leathery, lanceolate or ovate, mostly acute, usually

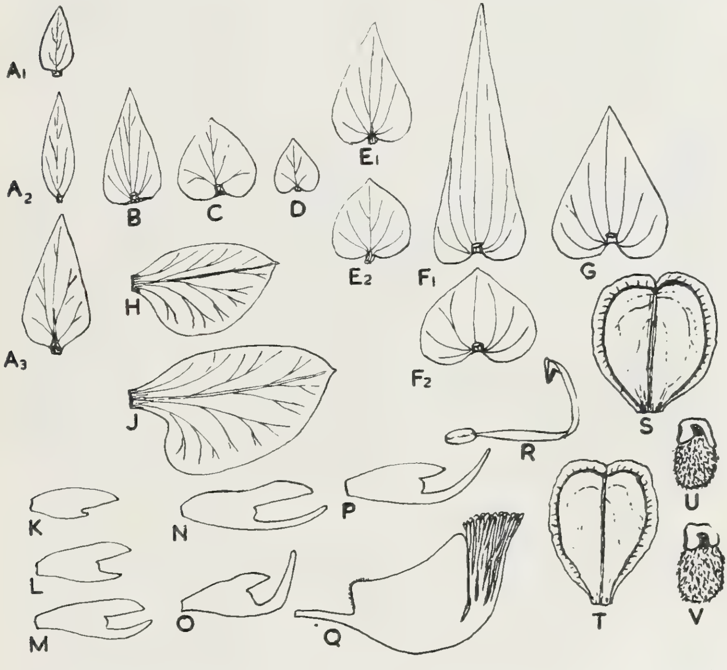

Fig. 1. *P. fruticosa* Berg. A—G, range of leaf form: A (1—3), Houw Hoek (Caledon); B, Storms Vlei (Swellendam); C, Albertinia (Riversdale); D, Seven Weeks Poort (Ladismith); E (1—2), Boschberg (Somerset East); F (1—2), Baviaans Kloof (Humansdorp); G, Wilderness (George). H—J, inner sepals: H, Houw Hoek; J, Albertinia. K—P, side petals: K, Houw Hoek; L, Storms Vlei; M, Omklaarberg (Robertson); N, Ladismith; O, Albertinia; P, Baviaans Kloof; Q, carina, Albertinia; R, gynaecium (Albertinia). S—T, capsule: S, Houw Hoek; T, Knysna. U—V, seed: U, Houw Hoek; V, Ladismith. Magnification: A—G, nat. size; H—V × 2½.

cordate at the base, occasionally cuneate, very shortly petiolate. *Bract* and *bracteoles* at the base of each pedicel, 3. *Flowers* large, magenta or greenish, in short terminal racemes. Outer sepals 3·0—5·0 mm. long, ovate, ciliate; the inner 8·0—15·0 mm. long, asymmetrical, acute or subobtuse. Side *petals* 5·0—9·0 mm. long, unequally bilobed. *Carina*, including crest, 8·0—14·0 mm. long, the claw shorter than the limb, the limb deepest at the distal end; the crest penicillate, large. *Style* ribbon-like in its upper half, the anterior style branch very small, the posterior somewhat flattened, grooved above, bent with the stigma along the lower edge facing the style. *Capsule* broadly obovate with a well-developed marginal rim. *Seed* ellipsoidal pubescent, with a well-developed caruncle.

This species shows great variability both in its vegetative and floral parts. Some of the forms appear so distinctive that it is not surprising that workers in the past, with only dried herbarium specimens on which to base their conclusions, created several species which experience shows cannot be upheld. For example, De Candolle in the *Prodromus* recognized five species, and later workers increased the number. In the *Flora Capensis* Harvey wisely reduced them all to a single species in which he recognized eight varieties. Experience in the field has shown even these to have a very dubious value. There are undoubtedly distinctive geographical races but they merge into one another so that with increased knowledge it is not possible to establish sharply defined subspecific taxa that will serve a useful purpose. Furthermore, this species grows under a wide range of conditions, from damp riverside bush to dry stony places around the Karroo. As might be expected in the more mesophytic situations the leaves are larger and thinner. The difference between sun and shade leaves in a single locality is striking. The leaves must clearly be used with caution in any taxonomic study. Plants may be glabrous or pubescent in a single locality, so this character too is of no value in separating species.

Variability in the flower is equally striking. At Houw Hoek, the western limit of this species, the posterior lobe of the side petal is large and the anterior reduced to a mere tooth-like outgrowth (Fig. 1, K). Moving eastwards and approaching Swellendam, this species shows an increase in size of the anterior lobe, though it still remains smaller than the posterior (Fig. 1, L). In the Robertson, Montagu and Ladismith Divisions the lobes are of approximately equal length (Fig. 1, M and N). Further to the east and along the coastal strip from Riversdale to Knysna, there is a strong tendency for the anterior and narrower lobe to become longer than the posterior (Fig. 1, O and P). It is clear that there is a geographical series from west to east and that a long anterior lobe is characteristic of eastern forms. A similar series occurs in the closely related species *P. myrtifolia* (Fig. 2, O—T). Here too the long anterior lobe of the side petals characterises the eastern forms. Such series in related taxa were termed homologous series in variation by the late N. I. Vavilow and *Polygala* is only one of many South African genera in which the phenomenon is revealed by a study of variation within the species.

P. fruticosa ranges from sea-level to an altitude of about 1,500 metres.

Ceres. Gydouw, *Leipoldt* 4044, 3074. Ezelsfontein, *Esterhuysen* 20358.

Worcester. Stettynsberg, *Esterhuysen* 15613. Keeromsberg, *Esterhuysen* 9233. Hex River Valley, *Tyson* 627.

Caledon. Houw Hoek, *Levyns* 9435. Bot River, *Ecklon & Zeyher: Wilman* 783. Wildepaardeberg, *Stokoe* 2733. Between Caledon and Villiersdorp, *Mathews*. Near Greyton, *Esterhuysen* 20756.

Swellendam. Hassequas Kloof, *Drege*. Rivierzondereinde, *Schlechter* 5633. Near Barrydale, *G. D. Morris* 169. Near Swellendam, *R. N. Parker* 4420: *Walgate* 848. Malagas, *Esterhuysen* 4344. Tradouw Pass, *Levyns* 10112. Between Swellendam and Storms Vlei, *Levyns* 9163.

Robertson. Omklaarberg, *Levyns* 9796. Between McGregor and Storms Vlei, *Leipoldt* 3163: *Esterhuysen* 4306.

Montagu. Baden, *Levyns* 8006. Cogmans Kloof, *G. D. Morris* 156. Montagu, *Levyns* 86, 162, 6512, 8932.

Riversdale. Albertinia, *Levyns* 9700. Near Riversdale, *Bolus* (11210 in Herb. Bol.).

Mossel Bay. Ruytersbosch, *Van Niekerk* 72.

George. Thirty miles east of George, *Hutchinson* 1301. Wilderness, *Levyns* 741, 9149. Montagu Pass, *C. Thorne* (51625 in S. Af. Mus.).

Ladismith. Roodeberg, *Compton* 3828. Prins Poort Berg, *Levyns* 6164. Ladismith, *Levyns* 9101. Seven Weeks Poort, *Levyns* 2459.

Laingsburg. Fisantekraal, *Compton* 21094.

Knysna. Knysna, *Hutchinson* 1332. Paardekop, *Macnae* 1009.

Uniondale. Joubertina, *Esterhuysen* 10590. Slypsteenberg, *Esterhuysen* 6315.

Willowmore. Baviaans Kloof, *Fourcade* 5182.

Humansdorp. Otterford, *Rodin* 1116. Baviaans Kloof, *Levyns* 9136. Jeffreys Bay, *Fourcade* 5923. Assegai Bosch, *Esterhuysen* 6720.

Somerset East. Boschberg, *MacOwan* 1746: *Levyns* 5574.

Uitenhage. Witteklip, *Holland* 3592: *Rodin* 1032. Zuurberg, *Zeyher: Rennie* 448. Addo, *Drege*.

Port Elizabeth. Swartkops River, *Zeyher* 1926.

Alexandria. Olifants Hoek, *Zeyher* (29248 in S. Af. Mus.).

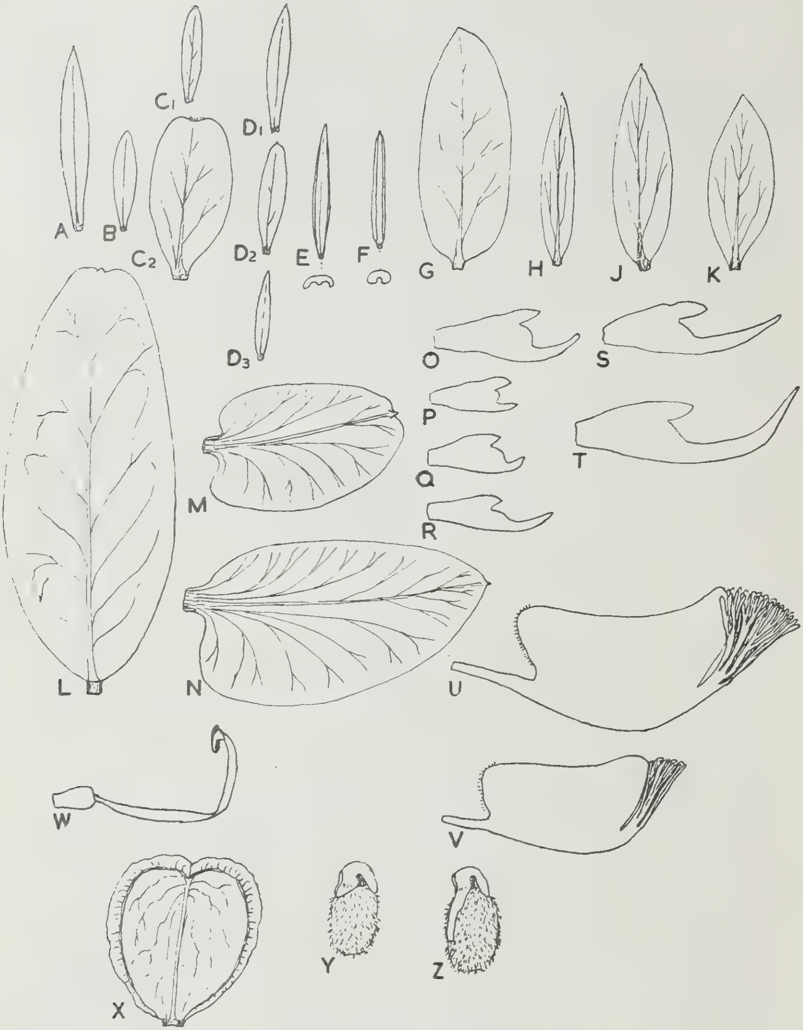

FIG. 2. *P. myrtifolia* L. A—L, range of leaf form: A, Van Rhyns Pass (van Rhynsdorp); B, Akkerdam (Calvinia); C (1—2), Rooi Els (Caledon); D (1—3), Albertinia (Riversdale); E, Ladismith (cross section of leaf, enlarged, shown below); F, Uniondale (cross section of leaf, enlarged, shown below); G, Knysna; H, Baviaans Kloof (Willowmore); J, Baviaans Kloof (Humansdorp); K, Zuurberg (Somerset East); L, Pondoland. M—N, inner sepals: M, Van Rhyns Pass; N, Baviaans Kloof (Humansdorp). O—T, side petals: O, Van Rhynsdorp; P, Rooi Els; Q, Albertinia; R, Ladismith; S. Knysna; T, Baviaans Kloof (Humansdorp). U—V, carina: U, Baviaans Kloof (Humansdorp); V, Uniondale; W, gynaecium, Van Rhyns Pass; X, capsule, Rooi Els. Y—Z, seeds: Y, Rooi Els; Z, Knysna. Figs. A—L, nat. size, M—Z × 2½.

Fort Beaufort. Katberg, *Drege.*

Cathcart. Windvogelberg, *Drege.*

Kentani. *Pegler* 306. Kei River Mouth, *Flanagan* (29255 in S. Af. Mus.).

Transkeian Territories. Between Umkwani & Omsakaba River, *Tyson* 2639.

Natal. Pinetown, *Schlechter* 3170.

2. **Polygala myrtifolia** L. Sp. Pl. I 703 (1753): Thunb. Prod. 120 (1800): DC. Prod. I 322 (1824): Harvey in Harv. & Sond. Fl. Cap. I 83 (1859–60): Levyns in Adamson & Salter Fl. Cap. Penin. 543 (1950). *P. amoena* Thunb. Prod. 120 (1800). *P. ligularis* Ker. Bot. Reg. t. 637 (1822). *P. cluytioides* DC. Prod. I 322 (1824). *P. grandiflora* Lodd. Cab. t. 1227 (1827). *P. pinifolia* Poir. Encyc. V 492 (1804): III. t. 598 f. 2 (1823). *P. eckloniana* Presl Bot. Bemerk. 14 (1844). (Fig. 2, A—Z)

A branched shrub, usually erect, from 30 cm. to 2 m. high, glabrous or pubescent. *Leaves* alternate, shortly petiolate, 14·0—70·0 mm. long, flat or revolute, acicular, linear, lanceolate, elliptical, obovate or oblong, obtuse or acute, usually narrowing towards the base. *Bract* and *bracteoles* at the base of each pedicel, 3. *Flowers* large, magenta, pink or rarely white, in short terminal racemes. Outer *sepals* 5·0—8·0 mm. long, ovate, acute or subobtuse, concave, glabrous or pubescent, ciliate, sometimes with a scarious margin: inner sepals 12·0—18·0 mm. long, more or less asymmetrical, occasionally somewhat cordate at the base, mucronulate, obtuse or acute. Side *petals* unequally bilobed, 5·0—14·0 mm. long, the relative lengths of the lobes variable. *Carina*, including crest, 12·0—22·0 mm. long, the claw much shorter than the oblong or trapezoidal, ciliate or partially ciliate limb: the crest penicillate, ample or meagre. *Style* somewhat flattened, ribbon-like in the upper half, the anterior style branch small, the posterior well developed, flattened, grooved above, with the *stigma* along the lower edge. *Capsule* broadly obovate, with a narrow marginal wing. *Seed* ellipsoidal, pubescent, the caruncle with well developed membranous lobes.

This and the previous species are the two most variable of the south-western Polygalas. Many of the comments made in connection with *P. fruticosa* apply equally here. The range of leaf form is shown in Fig. 2, A—K. The side petals vary in much the same way though in no case is the posterior lobe larger than the anterior (Fig. 2, O—T). The anterior lobe shows the same tendency to become elongated in the eastern forms with the exception of forms from high altitudes in the Drakensberg in which the two lobes are of approximately the same length.

For similar reasons to those given under *P. fruticosa*, the varieties into which this species was divided by De Candolle and Harvey are not upheld. Several distinct forms are included here within the species but studies have revealed that they constitute a geographical series in which the extreme forms are very different but are connected by a series of intergrades which make separation into well defined taxa impossible. Genetical studies alone will reveal the true nature of a geographical series such as this. The form with broad leaves is the most widely spread, extending from the west to the east coast and north to Natal. Changes in habitat may induce variation in the leaf. For example, on the Cape Peninsula all gradations may be observed between the large shrub with thin leaves on the eastern slopes of Table Mountain to the low compact bushes with leathery leaves, common in the coastal bush. Similar edaphic changes may be observed in places such as Knysna where the riverside plants are very different in appearance from those of exposed stony places. If these habitat forms be eliminated we are left with others which cannot be explained in this way. A rather distinct form occurs in the Van Rhynsdorp and Calvinia Divisions (Fig. 2, A and B). In this the leaves narrow gradually at the apex and the base. This form is probably worthy of subspecific rank but other forms are less convincing. In the coastal belt of the Riversdale and Mossel Bay Divisions a form with much narrower leaves prevails. The name *P. ligularis* was given to this form by Ker-Gawl (Fig. 637, Bot. Reg.). Moving northwards from Riversdale into the Little Karroo, the leaves become even narrower and a tendency to become revolute is manifest. In the Ladismith Division this form is fairly constant (Fig. 2, E) but moving eastwards in the Oudtshoorn Division the leaves become narrower and more strongly revolute so that occasionally only a groove is visible above the midrib on the lower surface. This tendency towards the acicular type of leaf finds its ultimate expression in the Uniondale Division where the leaves are always acicular (Fig. 2, F). This form with rather long acicular leaves has in the past been recognized as a distinct species, *P. pinifolia*, Poir. Another feature distinguishing it from *P. myrtifolia* is its rather poorly developed crest. The crest consists of the same finely divided segments but they are few and the brush-like effect of the typical crest of *P. myrtifolia* is lacking. In the early stages of this research the different crest taken together with the fine acicular leaves, was deemed sufficient to allow this form to retain its generally recognized specific rank. However, examination of forms from the Oudtshoorn and Prince Albert Divisions have shown so complete a mingling of these features that it has become impossible to separate *P. pinifolia* from *P. myrtifolia*. For example, Bolus (11689 in Herb. Bol.) from near Cango in the Oudtshoorn

Division has leaves of the Ladismith type but the meagre crest of the Uniondale form. Stokoe 9043 from Kliphuis Vlei in the Prince Albert Division has acicular leaves combined with the large crest of typical *P. myrtifolia*. These are only two of the many forms which have convinced the author that *P. pinifolia* is merely the end of a geographical series and that it is inseparable from *P. myrtifolia*.

This species has a very wide range and is recorded from sea-level to about 3,100 metres.

Type. In the Linnaean Herbarium, London.

Calvinia. Akkerdam, *L. E. Taylor* 2812. Between Oorlogs Kloof and Papkuilsfontein, *Leipoldt* 3072. Calvinia district, *Leipoldt* 859.

Van Rhynsdorp. Van Rhyns Pass, *Levyns* 4094, 9461. Giftberg, *E. P. Phillips* 7361. Giftberg and Matjeskamma, *Leipoldt* 4045.

Clanwilliam. Onderbokkeveld, *Ecklon & Zeyher*.

Malmesbury. Constable Hill, *Macnae* 1072. Saldanha Bay, *Esterhuysen*.

Cape. Kirstenbosch, *Hutchinson* 12. Newlands, *Wolley Dod* 106. Table Mountain, *Guthrie* 562. Western slopes of Table Mountain, *E. Kensit* 72.

Caledon. Rooi Els, *Levyns* 9282: *Leighton* 295. Hawston, *Leighton* 407. Gansbaai, *Stokoe* 7397.

Bredasdorp. Frikkiesbaai, *Leighton* 1910. Cape Agulhas, *Esterhuysen* 4331.

Swellendam. Swellendam, *Walgate* 839. Warmwatersberg, *Compton* 20513.

Riversdale. Still Bay, *G. D. Morris* 258: *Levyns* 9504. Albertinia, *Levyns* 9670, 9665. Gouritz River, *Levyns* 9156, 9523: *B. Martin* 263. Riversdale, *Bolus* (11211 in Herb. Bol.).

Ladismith. Ladismith, *Levyns* 2060, 8961, 9028, 9037: *Compton* 3928. Anysberg, *Esterhuysen*. Seven Weeks Poort, *Levyns* 2431. Roodeberg, *Barker* 5482.

Mossel Bay. Cloetes Pass, *Levyns* 9655.

George. Klein Brak River, *Gillett* 1252. Wilderness, *Levyns* 740, 9148.

Oudtshoorn. Moeras River, *Esterhuysen* 19494. Robinson Pass, *Compton* 19609. Near Oudtshoorn, *Bolus* (11688 in Herb. Bol.). Between Calitzdorp and the Cango Caves, *Hutchinson* 1143. Rooi Krantz, *B. Hops* 59. Near Cango, *Bolus* (11689 in Herb. Bol.): *Rogers* 4642. De Rust, *Levyns* 3683.

Prince Albert. Eikenkraal, *Leipoldt*. Five miles beyond Kliphuis Vlei, *Stokoe* 9043. Middelwater near Klaarstroom, *Levyns* 6618.

Knysna. Groenvlei, *B. Martin* 264. Knysna, *Levyns* 7898. Formosa, *Fourcade* 5893.

Uniondale. Uniondale, *Levyns* 9632. Hot Springs, *Esterhuysen* 6268. Brak Kloof, *Bolus* 2256.

Willowmore. Baviaans Kloof, *Levyns* 9138. Kendo, *Drege.*

Humansdorp. Baviaans Kloof, *Levyns* 9137.

Uitenhage. Uitenhage, *Zeyher* 1924. Zwartkops River, *Ecklon & Zeyher.* Zuurberg, *Rennie* 444. Addo at Olifants Hoek, *Ecklon & Zeyher.*

Albany. Grahamstown, *Rennie* 75: *MacOwan* 96: *Rogers* 27383.

Transkeian Territories. Near Coast, *Rennie* 30. Between Umkwani and Omsakaba Rivers, *Tyson* 2628.

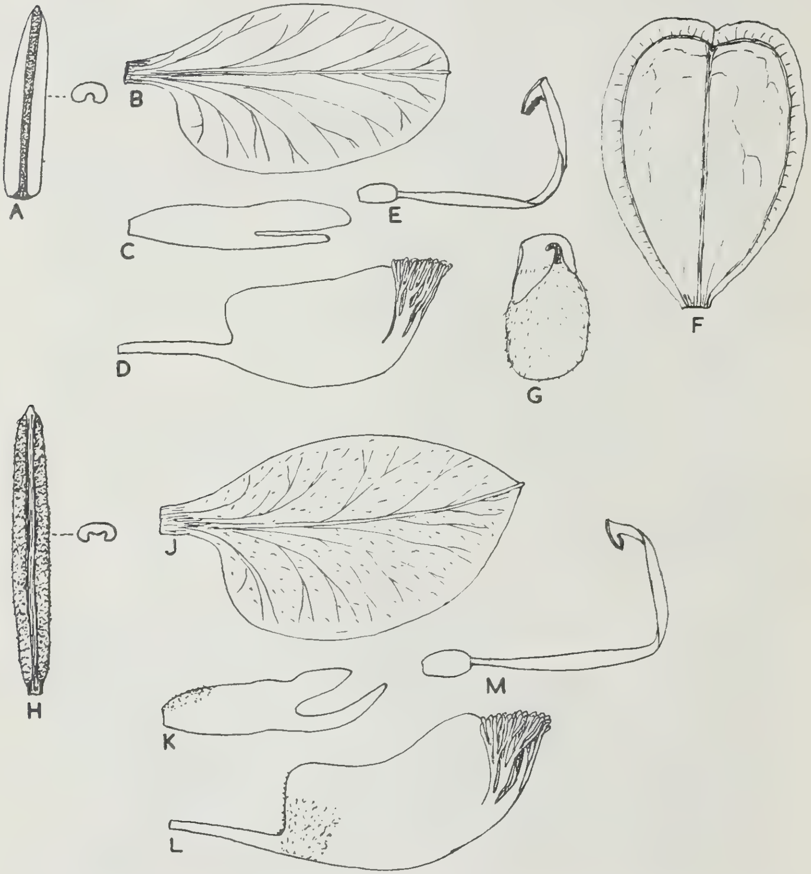

Fig. 3. *P. teretifolia* L.f. (A—G). A, leaf, with section; B, inner sepal; C, side petal; D, carina; E, gynaecium; F, capsule; G, seed. *P. lasiosepala* Levyns (H—M): H, leaf; J, inner sepal; K, side petal; L, carina; M, gynaecium. × 5.

Natal. Durban, *Medley Wood*, 262. Drakensberg, *Esterhuysen* 21669: *Marloth* 2882.

3. **Polygala teretifolia** L.f. Suppl. 316 (1781): Thunb. Prod. 120 (1800): Andr. Bot. Rep. t. 370 (1804): DC. Prod. I 323 (1824). Harvey in Harv. & Sond. Fl. Cap. I 83 (1859–60). (Fig. 3, A–G.)

A branched shrub up to 80 cm. high, the young stems closely covered with short white wool. *Leaves* 4·0—9·0 mm. long, alternate, patent, linear-terete with strongly revolute margins, mucronate, obtuse or truncate at the base, the upper surface glabrous, the groove filled with short white hairs similar to those on the stem. *Inflorescence* terminal or lateral, with few, pink, magenta or greenish flowers. Bracts and bracteoles at the base of each pedicel 3, ovate, acuminate, woolly when young, glabrescent. Outer *sepals* 3·0—4·0 mm. long, ovate, obtuse or subacute, mucronate, sparsely ciliate, with a narrow membranous edge: inner sepals 9·0—10·0 mm. long, slightly asymmetrical, obtuse, mucronate, glabrous. Side *petals* bilobed, about 7·0 mm. long, the lobes adjacent, the anterior lobe narrower and shorter than the posterior. *Carina*, including the crest, about 10·0 mm. long, the claw shorter than the limb, the crest finely divided, ample, reaching the level of the carina or projecting a little above it. *Style* flattened, ribbon-like, twisted, the anterior style branch lacking, the posterior flattened, grooved above, the *stigma* along the lower edge. *Capsule* obovate, with a narrow marginal rim. *Seed* ellipsoidal, sparsely puberulous, the caruncle with well developed membranous lobes.

P. teretifolia is characteristic of dry slopes near the junction of the Cape and Karroo floras, at altitudes from 360 to 1,220 metres.

There is no specimen of this species in the Linnaean Herbarium.

Montagu. Montagu, *Page* (15435 in Herb. Bol.). Dobbelaars Kloof, *Levyns* 6680. Ganna Leegte, *Levyns* 6469. Keisies Doorns, *Levyns* 203.

Riversdale. Garcias Pass, *Leighton*.

Ladismith. Ladismith, *Levyns* 2057, 8969. *Marloth* 3984.

Laingsburg. Whitehill, *Compton* 2599. Witteberg, *Esterhuysen* 5160.

Prince Albert. Near Prince Albert, *Bolus* (11434 in Herb. Bol.).

George. Klipdrift, *Schlechter* 2259.

4. **Polygala lasiosepala** Levyns sp. nov.

The species cited as *P. teretifolia* by Ecklon & Zeyher [No. 153, p. 20, Enum. Pl. (1834)] is almost certainly this species, though no specimen of No. 153 has been seen by the author. (Fig. 3, H–M.)

Frutex ramosus foliosus tomentosus, 1 m. altus vel minor. Folia 7·0—16·0 mm. longa, ericoidea, breviter petiolata, tomentosa. Inflorescentia terminalis vel lateralis, floribus paucis: pedunculi breves. Sepala tomentulosa: exteriora 3·2—4·2 mm. longa, obtusa: interiora fere 11·3 mm. longa, breviter apiculata. Petala lateralia fere 7·0 mm. longa, bilobata, lobis non contiguis. Carina (crista inclusa) 11·3 mm. longa, crista penicillata. Stylus curvatus circa medium, complanatus, tortilis: styli lobus posterior obliquus complanatus, stigmate in margine inferiore posito.

A much branched leafy tomentose shrub, up to 1 m. high. *Leaves* alternate, from 7·0—16·0 mm. long, ericoid, the midrib prominent within the groove on the lower surface, tomentose, shortly petiolate, with a minute apiculus. *Inflorescence* terminal or lateral, 1 or few flowered, the peduncles and pedicels rather short, tomentose, flowers pale, the alae light purple. Bract 1, tomentose, ovate, deciduous: bracteoles 2, similar but smaller. Outer *sepals* 3·2—4·2 mm. long, broadly ovate, obtuse, ciliate: inner sepals about 11·3 mm. long, somewhat asymmetrical, shortly apiculate, the veins diverging, all sepals tomentulose. Side *petals* about 7 mm. long, bilobed, the posterior lobe slightly shorter and wider than the anterior, the lobes with a wide interspace. *Carina*, including crest, 11·3 mm. long, the claw shorter than the limb, the limb deepest near the crest: the crest penicillate, of moderate size. *Style* curved near the middle, flattened and ribbon-like, the anterior style branch minute or lacking, the posterior flattened, oblique, channelled above, with the *stigma* along the under edge. *Capsule* unknown.

Type. *Stokoe* 8450 in the Bolus Herbarium.
Namaqualand. Jutbosch Kloof, Kamiesberg, *Pearson* 6794.
Clanwilliam. Nardouw Mountain, *Stokoe* 8450.

5. **Polygala peduncularis** DC, Prod. I, 323 (1824): Harvey in Harv. & Sonder Fl. Cap. I, 84 (1859–60). (Fig. 4, A–G.)

Plant woody with long decumbent glabrous, scabrous or villous, angular branches. *Leaves* alternate, shortly petiolate, 10·0—25·0 mm. long, linear or linear-lanceolate, revolute, mucronate, obtuse at the base. Bracts and bracteoles 3, ovate, acute. *Flowers* large, pink or magenta, few to several in a lateral or occasionally terminal raceme, the peduncle long. Outer *sepals* 4·0—5·0 mm. long, ovate, obtuse, glabrous, with a membranous edge: inner sepals about 15·0 mm. long, asymmetrical, somewhat obtuse. Side *petals* about 10·0 mm. long, deeply bilobed, the lobes of approximately the same length, the posterior wider, with a small tooth-like outgrowth between the lobes. *Carina*, including crest, about 17·0 mm. long, the claw shorter than the deep limb: crest large, penicillate. *Style* ribbon-like, twisted, the anterior style branch lacking, the posterior flattened, narrowly grooved above, the *stigma* along the lower edge. *Capsule* obovate with a membranous edge. *Seed* broadly ellipsoidal, hairy.

P. peduncularis has a discontinuous distribution of a somewhat unusual type. In the Clanwilliam Division it has been recorded several

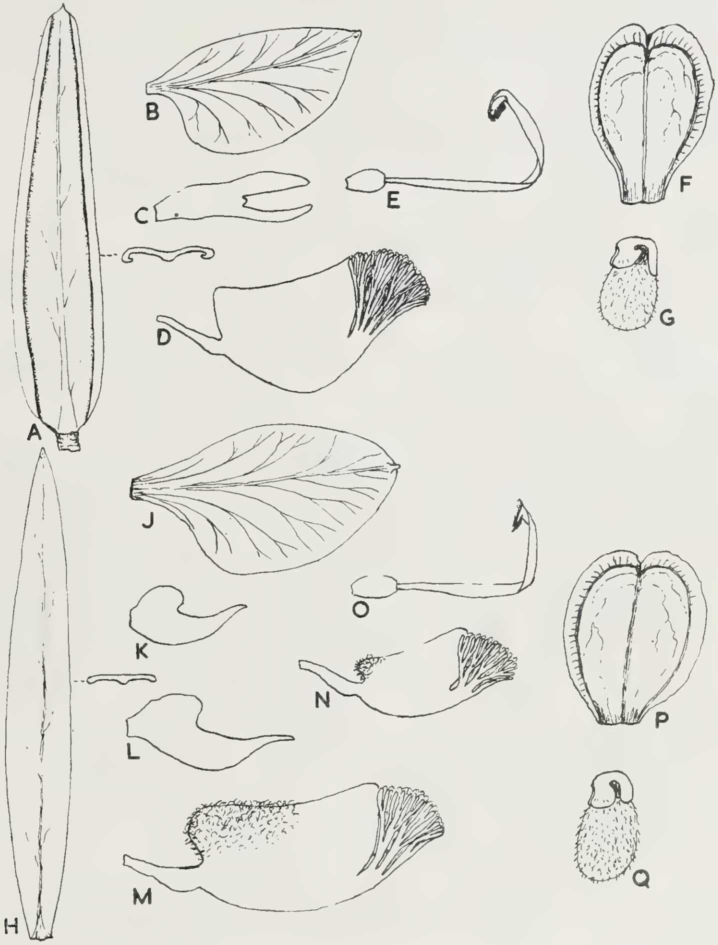

Fig. 4. *P. peduncularis* DC. (A—G): A, leaf with section; B, inner sepal; C, side petal; D, carina; E, gynaecium; F, capsule; G, seed. *P. bracteolata* L. (H—Q): Drawings from a plant growing in Pakhuis Pass except K and M, from Garcias Pass, Riversdale: H, leaf with section; J, inner sepal; K and L, side petals; M and N, carina; O, gynaecium; P, capsule; Q, seed. × 2½.

times on sandy mountain slopes at not very great elevations. All other records of it are in the extreme south, from Bredasdorp to Knysna in sandy places, usually not many miles from the sea. It is one of the most showy species of *Polygala* and is not likely to have been overlooked by collectors.

Clanwilliam. Between Langvalei and Olifants River, *Drege.* Zeekoe Vlei, *Ecklon & Zeyher.* Nardouw Pass, *Salter* 7543. Pakhuis Pass *Pillans* 7085.

Bredasdorp. Near Struys Bay, *Esterhuysen* 4319.

Swellendam. Mouth of the Breede River, *Levyns* 8373.

Riversdale. Mouth of the Gouritz River, *Levyns* 9524. Droogevlakte, *Muir* 1270.

George. Outeniquaberg, *Drege* 7188.

Knysna. Seventeen miles south of Avontuur, *Salter* 6756.

6. **Polygala bracteolata** L. Sp. Pl. ed. 1, 702 (1753): Thunb. Prod. 120 (1800): DC. Prod. I 322 (1824): Harvey in Harv. & Sond. Fl. Cap. I 84 (1859–60): Levyns in Adamson & Salter F. Cap. Penin. 544 (1950). Burm. Rar. Pl. Afr. t. 73, fig. 5 (1738): Bot. Mag. 10 345 (1796). *P. umbellata* Thunb. Prod. 120 (1800): non Linn. (1771). *P. calycina* Presl Bot. Bemerk., 15 (1844). (Fig. 4, H–Q.)

Suffruticose, glabrous or villous, erect or decumbent, up to 80 cm. high. *Leaves* alternate, lanceolate or linear, obtuse or acute. *Inflorescence* terminal, many-flowered the flowers pink, magenta or rarely white. Bracts and bracteoles 3, lanceolate or narrowly elliptical, acute, glabrous or nearly so. Outer *sepals* 4·0—6·0 mm. long, ovate, obtuse or somewhat acute, glabrous: inner sepals 11·0—16·0 mm. long, slightly asymmetrical, mucronate, obtuse or somewhat acute, glabrous. Side *petals* 7·0—9·0 mm. long, unequally bilobed, anterior lobe the longer. *Carina*, including the crest, 13·0—19·0 mm. long, the claw shorter than the limb, the limb hairy towards the base, the crest ample, penicillate. *Style* flattened, ribbon-like, the anterior style branch small or lacking, the posterior beak-like, grooved above, the *stigma* along the lower edge. *Capsule* obovate, with a marginal rim. *Seed* broadly ellipsoidal, hairy.

P. bracteolata occurs from sea-level to about 900 metres.

Type. In the Linnaean Herbarium London.

Van Rhynsdorp. Giftberg *E. P. Phillips* 7363.

Clanwilliam. Cedarberg *Leipoldt* 852. Olifants River *Stephens* 7213. Between Greys Pass and Clanwilliam *Leipoldt* 3787. Grasruggens Mountains *Pillans* 8768. Elands Kloof, *Levyns* 9254. Pakhuis Pass, *Levyns* 9442.

Piketberg. Between Avontuur Mountain and Zebra Kop, *Pillans* 7503.

Ceres. Michells Pass, *Stokoe* (61147 in S.A. Mus.).

Worcester. Louws Hoek Peak, *Esterhuysen* 11173. Du Toits Peak, *Esterhuysen* 16071. Du Toits Kloof, *Pillans* 8447: *Levyns* 8621.

Tulbagh. Tygerkloof, *Pappe.*

Paarl. French Hoek, *Bolus* 5002. Near Pniel, *Esterhuysen* 14044. French Hoek Pass, *Leighton* 2883.

Stellenbosch. Stellenbosch, *Levyns* 2040. Jonkershoek, *Levyns* 7499. Helderberg, *Esterhuysen* 14626. Somerset West, *Parker* 3582.

Cape. Bonteberg, Cape Peninsula, *Levyns* 9274. Devils Peak, *Pappe.* Cape Peninsula, *Salter* 3951. Observatory, *Leighton* 639. Lions Head, *Esterhuysen* 15764.

Caledon. Between Hermanus and Stanford, *M. C. Gillett* 4388. Swartberg, *Esterhuysen* 18935. Bot River, *Wilman* 787. Rooi Els, *Leipoldt: Levyns* 9281. Palmiet River Mouth, *Levyns* 7775. Viljoens Pass, *Levyns* 8356. Elgin, *Levyns* 3382.

Robertson. Boesmans Pass, *Levyns* 9198: *Esterhuysen* 4284.

Swellendam. River Zondereinde, *Stokoe* 8995. Potteberg, *Walgate* 902. Grootvadersbosch, *Walgate* 892.

Riversdale. Garcias Pass, *Levyns* 8992. Mozambique Kop, *Thorne* (38987 in S.A. Mus.). Langeberg, *Schlechter* 1915. Albertinia, *Muir* 1602.

Mossel Bay. Robinson Pass, *Hops* 58.

George. Jonkersberg, *Esterhuysen* 19392.

Humansdorp. Lourie Plantation, *Holland* 4067. Witte Els Bosch, *Esterhuysen.*

7. **Polygala microlopha** DC. Prod. I 322 (1824): Turcz. Bull. Soc. Imp. Nat. Mosc. 27, 345 (1855). *P. macra* Chodat Mem. Soc. Phys. Genève, 31, 425 (1893): non DC. (1824). *P. ericaefolia* Harvey in Harv. & Sond. Fl. Cap. I 87 (1859–60) (partly): non DC. (1824). (Fig. 5, A–J.)

The author has not seen Burchell 3416, the type of the species. However, there can be little doubt that the species described below is the one named *M. microlopha* by De Candolle. Burchell gathered his specimens at Zwartwater Poort on his way to Riebeeck East, an area in which this species is common. De Candolle notes that its crest is small for the section in which he placed it. The poorly developed crest is a striking feature of the present species. Furthermore the very short pedicels emphasised by De Candolle are characteristic.

A small sparsely leafy glabrous shrub up to 60 cm. high. *Leaves* alternate, usually 2·0—6·0 mm. long, rarely up to 15·0 mm. long, linear or elliptical, thick, flat or grooved above, shortly ciliate or the margin scabrous. *Inflorescence* terminal, few flowered, the pedicels short, glabrous or pubescent, the flowers pink, magenta or white. Bracts and bracteoles 3, ovate or oblong, acute or obtuse, ciliate. Outer *sepals* 3·5—4·0 mm. long, ovate, glabrous, ciliate, occasionally with short hairs along the midrib: inner sepals 8·0—10·0 mm. long, not or only slightly asymmetrical, mucronate, acute or obtuse, glabrous. Side *petals* 5·0—6·5 mm. long, bilobed, the posterior lobe short, rounded, the anterior very long, narrow, curved, somewhat acute. *Carina*, including the crest, about 8·0 mm. long, the crest meagre consisting of a few narrow segments not reaching the level of the carina. *Style* flattened and twisted in the upper half, the anterior style branch lacking, the posterior flattened, grooved above, the *stigma* along the under edge. *Capsule* oblong, narrowed at the base, with a narrow rim. *Seed* oblong, hairy.

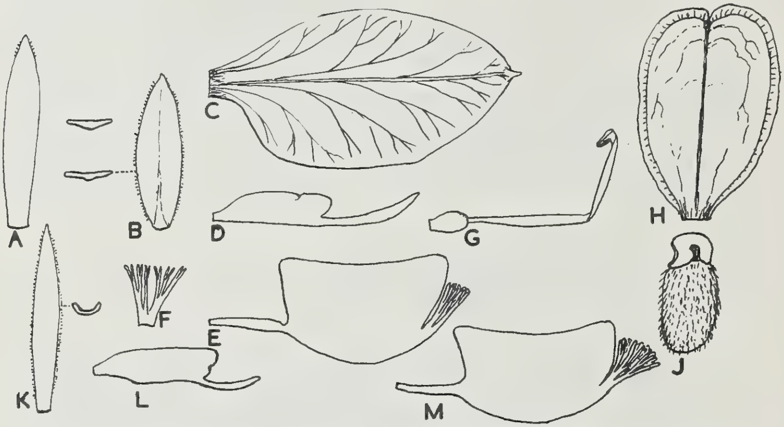

Fig. 5. *P. microlopha* DC. (A—J): A and B, leaves with cross section of each; C, inner sepal; D, side petal; E, carina; F, crest opened out; G, gynaecium; H, capsule; J, seed. *P. microlopha* DC. var. *gracilis* Levyns (K—M): K, leaf with cross section; L, side petal; M, carina. × 5.

P. microlopha is characteristic of dry places outside the main region of the Cape Flora.

Ladismith. Buffels Poort Berg, *Levyns* 7415. Touwsberg, *Levyns* 9070. Ladismith, *Levyns* 2092, 8964, 9031, 9109. Seven Weeks Poort, *Levyns* 2461: *Compton* 4022.

Oudtshoorn. Swartberg Pass, *Stokoe* 8804.

Mossel Bay. Ruytersbosch, *Van Niekerk* 8.

Prince Albert. *Bolus* (11436 in Herb. Bol.).

Graaff-Reinet. Cave Mountain. *Bolus* 539.

Murraysburg. Koudeveld, *Tyson* 482.

Uniondale. Laudina, *Esterhuysen* 6512. Kamanassie Mountains, *Ester-*

huysen 16449. Buffels River, *Fourcade* 5588. Mannetjiesberg. *Esterhuysen* 6496.

Humansdorp. Hankey Road, *Fourcade* 6073. Assegai Bosch, *Fourcade* 1424.

Uitenhage. Zuurberg, *Rennie* 446. Cradock Road, *Ecklon & Zeyher*. Bethelsdorp, *Zeyher*. Near Lourie, *Rodin* 1085.

Albany. Fish River Heights, *Hutton*. Near Grahamstown, *MacOwan*: *Rennie* 155.

King William's Town. Mount Coke, *T. R. Sim* 1424.

P. microlopha DC. var. **gracilis** Levyns var. nov. (Fig. 5, K–M.)

A *P. microlopha* DC. var. *microlopha* habitu graciliore, foliis angustioribus canaliculatis, petalorum lateralium lobo anteriore breviore, crista majore, valde distincta.

The variety differs from *P. microlopha* DC. var. *microlopha* in its more slender habit, in its narrower channelled leaves, in the somewhat shorter anterior lobe of the side petals and in the larger crest. The flowers are frequently white.

Ladismith. Waterkloof, *Levyns* 9063.

Knysna. Paardekop foothills, *Macnae* 1008.

8. **Polygala wittebergensis** Compton Trans. Roy. Soc. S. Af. 19, 298 (1931). (Fig. 6, A–K.)

An erect or decumbent undershrub, up to 70 cm. high. Branches scabrous or glabrous. *Leaves* alternate, erect or spreading, sessile, 4·0—12·0 mm. long, linear, linear-lanceolate or elliptical, flat or channelled above, acute or somewhat obtuse, apiculate, the midrib sometimes prominent below, scabrous, pubescent or glabrous. *Inflorescence* terminal, few flowered, the pedicels slender, short or of medium length, the flowers magenta, pink or white. Bracts and bracteoles 3, linear or lanceolate, acute, glabrous or pubescent. Outer *sepals* 3·0—4·5 mm. long, ovate, acute or obtuse, glabrous, ciliate or non-ciliate: inner sepals 9·0—10·5 mm. long, obtuse or somewhat acute, mucronate, glabrous. Side *petals* 3·5—5·0 mm. long, oblong, entire, or rarely with a very shallow depression at the apex, with a thin shortly hairy patch near the base on the posterior side, overlapping one another shortly. *Carina*, including the crest, 7·5—8·5 mm. long, the crest penicillate, of medium size. *Style* flattened, ribbon-like and twisted in the upper half, the anterior style branch lacking or very small, the posterior narrow, flattened and bent, channelled, with the *stigma* along the lower edge. *Capsule* obovate with a marginal rim. *Seed* ellipsoidal, hairy.

The type was collected on the Witteberg in the Laingsburg Division. It is pubescent in its younger parts and scabrous elsewhere. All plants

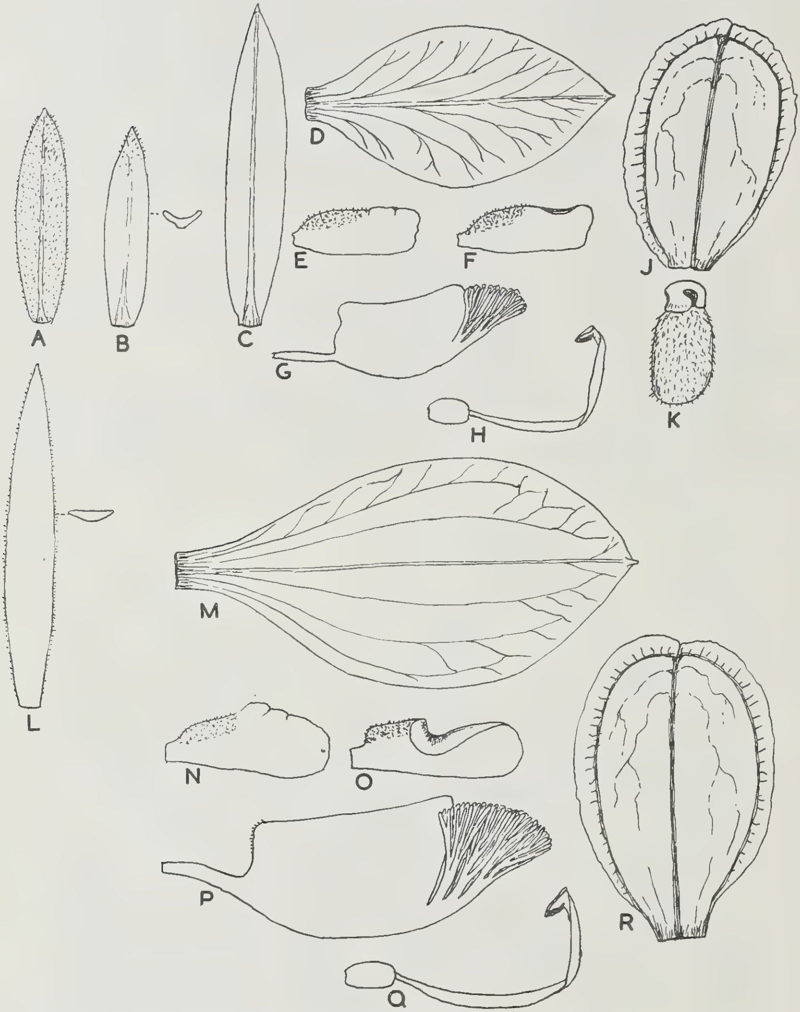

Fig. 6. *P. wittebergensis* Compton (A—K, all but B and C drawn from a specimen from the type locality): A, leaf; B, leaf from Garcias Pass, with cross section; C, leaf from Bredasdorp; D, inner sepal; E, side petal; F, side petals showing the one overlapping the other; G, carina; H, gynaecium; J, capsule; K, seed. *P. umbellata* L. (L—R): L, leaf with cross section; M, inner sepal; N, side petal; O, side petals showing the one overlapping the other; P, carina; Q, gynaecium; R, capsule. × 5.

in this area appear to be similar. Further to the west in the Swartruggens to the north of Ceres, plants agreeing closely with the type occur but are mixed with others having a tendency to become glabrous. No completely glabrous plants were found in this area. On moving southwards the glabrous tendency is emphasized so that in the Worcester and Montagu Divisions the leaves are almost glabrous but have short hairs near the apex and along the midrib on the under surface. Finally south of the Langeberg most plants have glabrous leaves. The floral characters, on the other hand, are fairly uniform.

Owing to the gradual change in vegetative features from north of south, it is not possible without further study to recognize more than one species. The specific epithet, *wittebergensis*, which was conferred when the species was believed to be confined to the Witteberg range in the Karroo, is somewhat unfortunate now that the species has been found to have a wide geographical range.

P. wittebergensis occurs at altitudes ranging from 1,400 metres to sea-level.

Type. *Compton* 3287 in the Bolus Herbarium.

Ceres. Kat Bakkies, *Levyns* 4131: *Adamson*. Gydo, *Leipoldt* 3073.

Worcester. Eendragt, *Levyns* 7954. Tafelberg, *Pillans* (14174 in Herb. Bol.). De Doorns, *Bolus* (13070 in Herb. Bol.). Kavadouws Mountain, *Esterhuysen* 10315.

Laingsburg. Witteberg, *Compton* 3287, 2561. Tweedside, *Levyns* 4131.

Montagu. Keur Kloof, *Lewis*. Concordia, *Levyns* 289. Keisiesberg, *Levyns* 8065. Baden, *Levyns* 8012. Between Montagu and the Koo, *Levyns* 7948.

Robertson. Near McGregor, *Leipoldt* 3786.

Bredasdorp. Near Bredasdorp, *Levyns* 4504, 8572, 8647. The Poort, *Esterhuysen* 2999: *Compton* 4376.

Swellendam. Near Barrydale, *M. Steyn* 251. Cape Infanta, *Walgate* 870.

Riversdale. Garcias Pass, *Levyns* 8999, 9000: *Bolus* (11212 in Herb. Bol.). Riversdale, *Levyns* 9512, 9662. Albertinia, *Muir* 1078. Gouritz River Bridge, *Levyns* 9157.

Ladismith. Roodeberg, *Levyns* 6074.

Mossel Bay. Cloetes Pass, *Muir* 1079.

Oudtshoorn. Swartberg Pass, *Esterhuysen* 4532.

Humansdorp. Rietvlei, *Esterhuysen* 6632. Loerie Plantation, *Dix* 45.

Port Elizabeth. Van Stadens Mountain, *Bolus* 539.

9. **Polygala umbellata** L. Mant. II 259 (1771): non Thunb. (1800). *P. ciliatifolia* Turcz. Animad. Bull. Soc. Imp. Mosc. 27, 347 (1855); Harvey in Harv. & Sond. Fl. Cap. I 87 (1859–60). *P. macra* auct. non DC., E. & Z. Enum. No. 166 (1834). (Fig. 6, L–R.)

The author has not seen the type specimen of *P. macra* DC. Prod. I 323 but considers it probable that it is the present species. De Candolle mentions dry places near the Breede River as the locality and the author has found *P. umbellata* in such a place (Levyns 9612).

Suffruticose, woody at the base only, glabrous or nearly so, erect or decumbent. 40·0 cm. high or less, branching chiefly near the base. *Leaves* alternate, linear or linear-lanceolate, up to 18·0 mm. long, acute, flat or slightly channelled above, ciliate. *Inflorescence* terminal, almost umbellate the pedicels slender, longer or shorter than the flowers, the flowers pink or magenta. Bracts and bracteoles 3, ovate or lanceolate, acute, glabrous, often ciliate. Outer *sepals* 3·0—5·0 mm. long, ovate, usually acute, often ciliate: inner sepals 8·0—11·5 mm. long, somewhat asymmetrical, acute or obtuse, mucronate, the veins usually anastomosing near the margin. Side *petals* 3·5—4·0 mm. long, entire, widest near the middle, the one deeply overlapped by the other, rounded at the apex, usually with a pubescent patch outside on the posterior side. *Carina*, including crest, 8·0—9·0 mm. long, the crest penicillate, of moderate size. *Style* flattened, ribbon-like, twisted, the anterior style branch small or lacking, the posterior flattened grooved above, *stigma* sub-terminal sometimes extending for some distance along the lower edge. *Capsule* narrowly obovate, with a small marginal rim. *Seed* ellipsoidal, hairy.

P. umbellata occurs in dry places at low or moderate elevations.

Type. In the Linnaean Herbarium, London.

Ceres. Gydouw, *Leipoldt* 4047.

Caledon. Caledon, *Guthrie* 3914. Near Gloria, Zondereinde River Bridge, *Salter* 6207. Hermanus, *Guthrie* 4125: *Bolus* 9854. Swartberg, *Esterhuysen* 18947. Shaws Mountain, *Levyns* 9498. Between Hermanus and Stanford, *M. C. Gillett* 4388. Hagedisberg Pass, *Levyns* 8439. Mountains near Houw Hoek, *MacOwan* 2901, 919. Near Bot River, Steenboks River and Klyn River, *Ecklon & Zeyher*.

Bredasdorp. Strandkloof, *Leighton* 1928. Near Elim, *Levyns* 9769. Between Elim and Raapjes River, *Levyns* 8432.

Swellendam. Near Breede River, *Levyns* 9162.

Riversdale. North of Garcias Pass, *Levyns* 8997.

10. **Polygala pottebergensis** Levyns sp. nov. (Fig. 7, A–G.)

Suffrutex, glaber. erectus, 20—60 cm. altus. Folia linearia, acuta plana vel canaliculata, breviter ciliata. Inflorescentia subumbellata. Pedicelli graciles. Sepala exteriora late ovata ciliata obtusa mucronata: sepala interiora nervis anastomosantibus. Petala lateralia trapezoidea, apice rotundata. Carinae crista ampla multifida. Stylus curvatus parce complanatus, lobis anterioribus et posterioribus longitudine similibus. Stigma terminale.

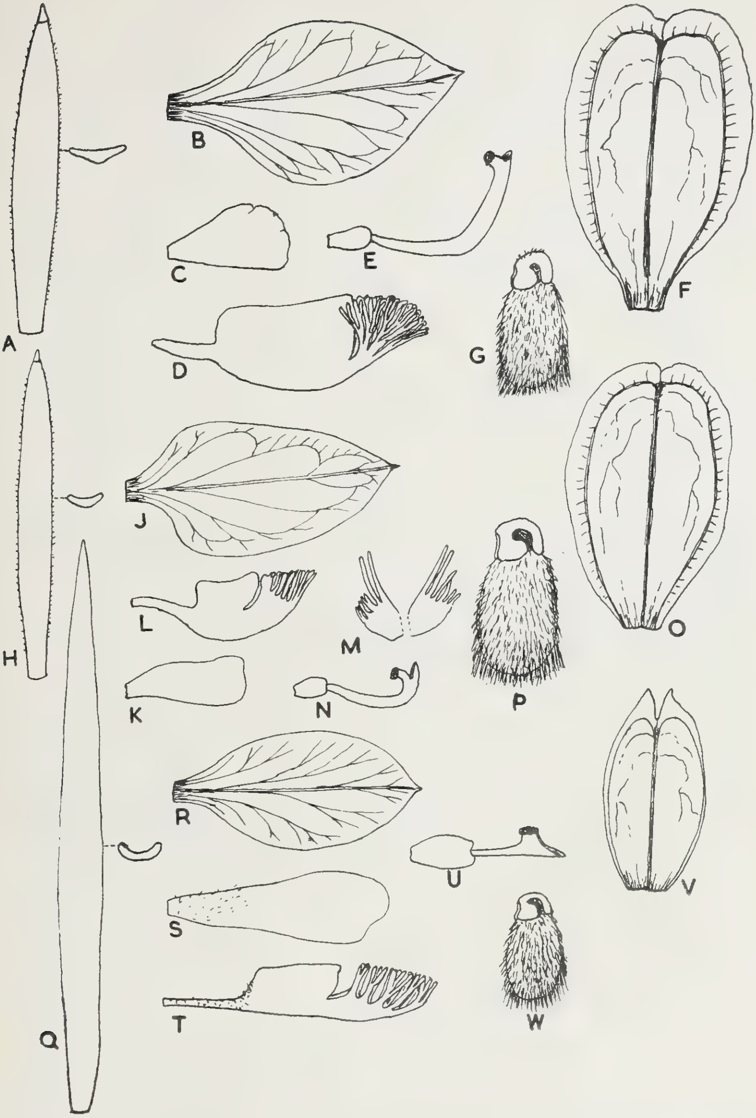

Fig. 7. *P. pottebergensis* Levyns (A—G): A, leaf with cross section; B, inner sepal; C, side petal; D, carina; E, gynaecium; F, capsule; G, seed. *P. recognita* Chodat (H—P): H, leaf with cross section; J, inner sepal; K, side petal; L, carina; M, crest opened out and viewed from within; N, gynaecium; O, capsule; P, seed. *P. garcini* DC. (Q—W): Q, leaf with cross section; R, inner sepal; S, side petal; T, carina; U, gynaecium; V, capsule; W, seed. × 5.

Suffruticose, woody at the base, erect, branching occasionally, glabrous, from 20—60 cm. high. *Leaves* alternate, more or less erect, linear, flat or channelled, from 6·0—12·0 mm. long, shortly ciliate, acute, mucronate. *Inflorescence* terminal, sub-umbellate, the pedicels slender, longer or shorter than the flowers, the flower pink or magenta. Bract and bracteoles 3, ovate lanceolate, acute, glabrous, ciliate. Outer *sepals* 3·0—4·0 mm. long, broadly ovate, ciliate, obtuse, mucronate: inner sepals 9·0—10·0 mm. long mucronate, the veins usually conspicuous and anastomosing. Side *petals* 3·5—4·0 mm. long, trapezoidal, rounded at the apex, the anterior margin the longer. *Carina*, including crest, 8·0—9·0 mm. long, the claw shorter than the limb, the crest ample, penicillate. *Style* slightly flattened but not twisted and ribbon-like, the two style branches of about equal length, the *stigma* terminal on the posterior. *Capsule* narrowly obovate, with a narrow marginal wing. *Seed* ellipsoidal, hairy.

P. pottebergensis is closely related to *P. umbellata* from which the broadly ovate outer sepals and the gynaecium distinguish it. It appears to be confined to the country on the west bank of the Breede River near its mouth. It ranges from about 30 metres to about 390 metres on the Potteberg Mountains.

Type. *Levyns* 8396 in the Bolus Herbarium.

Swellendam. Hamerkop, *Levyns* 8405, 8396. Near Cape Infanta, *Levyns* 8376. Potteberg, *Walgate*.

11. **Polygala recognita** Chodat Mem. Soc. Phys. Genève, 31, 228 (1893). Levyns in Adamson & Salter Fl. Cap. Penin. 544 (1950). (Fig. 7, H–P.)

Suffruticose, erect, 40 cm. high or less, little branched. *Leaves* alternate, acicular, acute, 5·0—12·0 mm. long, erect, glabrous, shortly ciliate. *Inflorescence* terminal, umbellate, the pedicels slender, glabrous, usually a little shorter than the flowers. Bract and bracteoles 3, lanceolate, keeled, glabrous, ciliate. Outer *sepals* 3·0—4·0 mm. long, ovate, somewhat acute, glabrous, ciliate: inner sepals 7·0—9·0 mm. long, slightly asymmetrical, acute, apiculate, the veins conspicuous, often anastomosing. Side *petals* about 4·0 mm. long, entire, widening gradually to the rounded apex, the margin wavy near the apex. *Carina*, including crest, about 5·5 mm. long, the limb about as long as the claw: the crest about as long as the limb, undivided in the lower half, divided above into narrow unequal segments. *Style* more or less terete, curved, the style branches more or less equal in length, the *stigma* terminal or subterminal on the posterior branch. *Capsule* obovate with a marginal rim. *Seed* ellipsoidal, covered with rather long hairs.

P. recognita is confined to the Cape Peninsula, occurring at various elevations.

Cape. Chapmans Peak, *Wolley Dod* 1830. Steenberg, *Esterhuysen* 15827. Orange Kloof, *Esterhuysen* 17567. Table Mountain above Llandudno, *Esterhuysen* 19245. Redhill, *Levyns* 5318. Simonstown, *Levyns* 8371. Klaver Valley, *Salter* 6431. Bonteberg, *Levyns* 5917, 9273.

12. **Polygala garcini** DC. Prod. I 323 (1824): E. & Z. Enum. 21 (1834): Harvey, Harv. & Sond. Fl. Cap. I, 88 (1859–60): Levyns in Adamson & Salter, Fl. Cape Penin. 544 (1950). *P. dodii* Schlechter Journ. Bot. 24 (1898). (Fig. 7, Q–W.)

P. zahlbruckneri Hayek, Ann. Hofmus. Wien XV, 45 (1900) is probably this species but the type has not been seen.

Undershrub, woody below ground level, 40 cm. high or less, sparsely branched, usually glabrous, rarely pubescent. *Leaves* alternate, linear or acicular, usually channelled above, acute, 8·0—20·0 mm. long. *Inflorescence* an elongated terminal raceme, the pedicels shorter than the flowers. Bracts and bracteoles 3, ovate or lanceolate, usually ciliate, deciduous. Outer *sepals* about 3·0 mm. long, broadly ovate, obtuse, mucronate, ciliate: inner sepals 8·0—11·0 mm. long, symmetrical or nearly so, acute or obtuse, the veins not or scarcely anastomosing. Side *petals* 6·0—7·5 mm. long, exceeding the limb of the carina, widest in the upper half, obtuse, slightly bilobed, sparsely hairy outside in the lower half. *Carina,* including the crest, 7·0—10·0 mm. long, the claw slightly longer than the limb, the crest projecting forward, undivided at its base, the ultimate finely divided lobes some distance from the carina. *Style* straight, terminated by the large, expanded, acute, infolded sterile anterior branch, the posterior branch more or less at right angles, with a terminal *stigma.* *Capsule* oblong, bidentate. *Seeds* narrowly ellipsoidal, hairy, the lobes of the caruncle short.

This very distinct species is easily recognized. It shows less variation than the other common species in this genus. It ranges from sea-level to about 900 metres.

Van Rhynsdorp. Between Nieuwoudtville and Oorlogs Kloof, *Leipoldt* 3790.

Clanwilliam. Between Greys Pass and Graafwater, *Leipoldt* 3162.

Ceres. Gydouw, *Leipoldt* 3791.

Worcester. Bonteberg, *Esterhuysen* 3744.

Malmesbury. Near Pella, *Levyns* 9414.

Cape. Road to Melkbos Strand, *Esterhuysen* 18874. Near Joostenberg, *Esterhuysen* 16011. Kalk Bay, *Levyns* 9272. Kommetje, *Goulimis.* Castle Rock, near Millers Point, *Wolley Dod* 813 (Type of *P. dodii* Schlechter), 2272: *Salter* 6480: *Levyns* 6019. Camp Ground, *Wolley*

Dod 104. Rondebosch, *Levyns* 3299. 8783. Tokai Flats, *Levyns* 5263. Kenilworth, *Bolus* 2712.

Paarl. French Hoek, *E. P. Phillips* 8270. French Hoek Pass, *Esterhuysen* 18900. Near Kraaifontein, *Wilman* 943.

Stellenbosch. Somerset Strand, *Parker* 4137.

Caledon. Shaws Mountain, *Levyns* 9491. Hangklip, *Rodin* 3136.

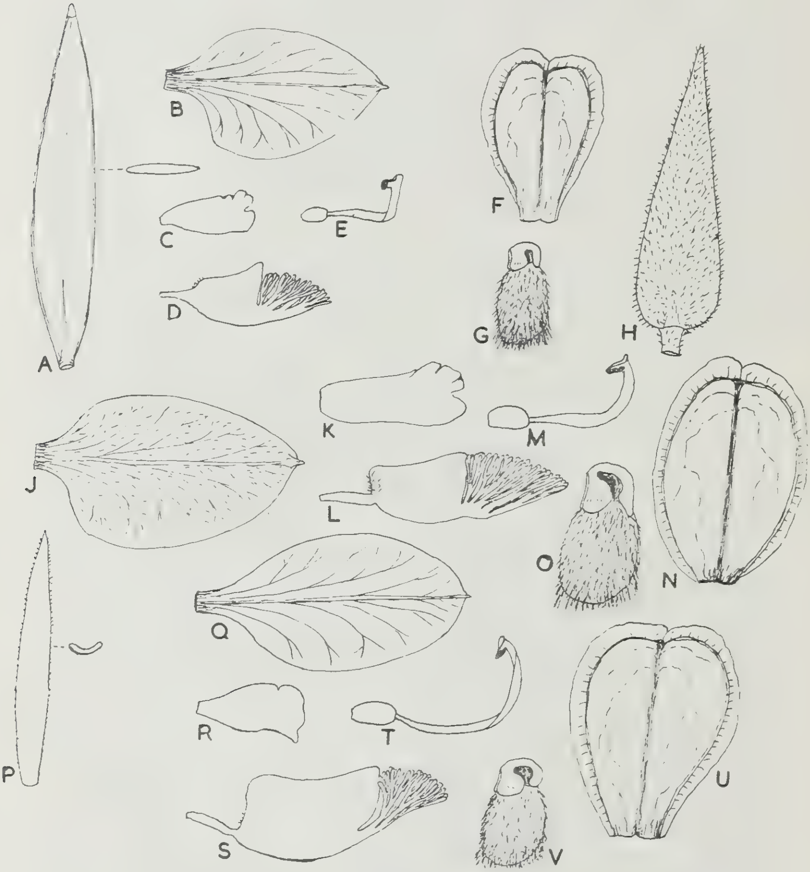

FIG. 8. *P. triquetra* Presl (A—G): A, leaf with cross section; B, inner sepal; C, side petal; D, carina; E, gynaecium; F, capsule; G, seed. *P. pubiflora* DC. (H—O): H, leaf; J, inner sepal; K, side petal; L, carina; M, gynaecium; N, capsule; O, seed. *P. ericaefolia* DC. (P—V): P, leaf with cross section; Q, inner sepal; R, side petal; S, carina; T, gynaecium; U, capsule; V, seed. × 5.

Bredasdorp. Near Elim, *Levyns* 8431. Strandkloof, *Levyns* 8652. Napier, *Esterhuysen* 3050. Bredasdorp, *Esterhuysen* 19170.

Swellendam. Malagas, *Esterhuysen* 4342. Cape Infanta, *Levyns* 8381. Hamerkop, *Levyns* 8419. Attaquas Kloof, *Drege* 7203. Trado, *Drege* 7210. Barrydale, *Levyns* 582.

Riversdale. Near Riversdale, *Bolus* (11202 in Herb. Bol.).

Mossel Bay. Ruyters Bosch, *Van Niekerk* 33.

Oudtshoorn. Near Oudtshoorn, *Hops.*

Laingsburg. Klein Swartberg, *Levyns* 9560.

Knysna. Knysna, *Duthie* 774a.

13. **Polygala triquetra** Presl Bot. Bemerk 15 (1844). Harvey in Harv. & Sond. Fl. Cap. I, 85 (1859–60). (Fig. 8, A–G.)

This species is based on Drege 7193 which has not been seen by the author. There is no record of its locality.

A scantily branched, erect, glabrous undershrub, up to 80 cm. high, the stems sharply triangular in section, sometimes almost winged. *Leaves* alternate, up to 25·0 mm. long, very shortly petiolate, linear or linear-lanceolate, acute, rigid, with a narrow translucent margin, usually somewhat distant. *Inflorescence* terminal, racemose, many flowered, the pedicel about as long as the flower, the flowers pink or magenta. Bract and bracteoles 3, lanceolate, keeled, acute, ciliate. Outer *sepals* 5·0 mm. long or less, ovate, acute, glabrous, sparsely ciliate near the tip: inner sepals 12·0—14·0 mm. long, slightly asymmetrical, apiculate. Side *petals* about 6·0 mm. long, as long as the carina without the crest, widening gradually to the shortly bifid, obtuse, somewhat frilled apex. *Carina*, including crest, about 11·0 mm. long, the claw shorter than the limb, the crest about as long as the limb, the numerous narrow branched segments united for some distance at the base. *Style* somewhat flattened, sharply bent near the middle, the anterior sterile style branch well developed, continuing the line of the style, the posterior style branch short, at right angles to the style, the *stigma* terminal. *Capsule* obovate, with a marginal wing. *Seed* ellipsoidal, hairy, the lobes of the caruncle short.

P. triquetra occurs from sea-level to about 1,200 metres.

Swellendam. Tradouw Pass, *Levyns* 644.

Riversdale. Garcias Pass, *E. P. Phillips* 402.

Knysna. Between the Wilderness and Knysna, *M. Gillett* & *L. Bolus* (18521 in Herb. Bol.). Knysna, *Salter* 6930. Between Knysna and Plettenberg Bay, *Zeyher* 72.

Humansdorp. Ratelsbosch, *Fourcade* 55. Witte Els Bosch, *Gillett* 2249.

Uniondale. Die Hoek near Joubertina, *Esterhuysen* 6862, 16357. Helpmekaar Mountain, *Compton* 5187.

14. **Polygala pubiflora** DC. Prod. I, 322 (1824): Harvey in Harv. & Sond. Fl. Cap. I, 90 (1859–60). (Fig. 8, H–O.)

Suffruticose, rigid, villous, spreading or decumbent, the leaves somewhat distant. *Leaves* alternate, 5·0—10·0 mm. long, lanceolate or ovate, acute, thick, flat, villous below, glabrous or nearly so above, ciliate. *Inflorescence* terminal, racemose, contracted, the pilose pedicels much shorter than the flowers. Bract and bracteoles 3, ovate, pilose. Outer *sepals* 3·0—4·0 mm. long, broadly ovate, obtuse, sometimes shortly apiculate, pilose on and near the midrib, ciliate: inner sepals 8·0—9·0 mm. long, more or less symmetrical, apiculate, scantily pilose outside. Side *petals* 4·5—5·0 mm. long, more or less oblong but widening slightly in the upper half, shortly and equally bilobed. *Carina*, including crest, 7·5—8·0 mm. long, the claw a little shorter than the limb, the crest ample, about as long as the limb in profile. *Style* bent about the middle, not much flattened, the anterior style branch small, the posterior a little larger, channelled above, with the *stigma* along the lower edge. *Capsule* oblong, with a marginal rim, glabrous. *Seed* ellipsoidal, densely hispid.

P. pubiflora occurs at low and moderate elevations.

Swellendam. Near Duivenhoks River, *Ecklon & Zeyher.*
Riversdale. Still Bay, *Muir* 413. Riversdale, *Schlechter* 1885: *Bolus* (11209 in Herb. Bol.). Oakdale, *Levyns* 3046, 3518a.
Mossel Bay. Gouritz River, *Ecklon & Zeyher.*
Knysna. Near Plettenberg Bay, *Leipoldt* (17082 in Herb. Bol.).

15. **Polygala ericaefolia** DC. Prod. I 323 (1824): Chodat, Mem. Soc. Phys. Genève XXXI, 426 (1893). *P. ericaefolia* DC. var *eckloniana* Harvey in Harv. & Sond. Fl. Cap. I 87 (1859–60), excluding all the remainder. (Fig. 8, P–V.)

Suffruticose, leafy, branching chiefly near the base, erect, up to 40 cm. high, glabrous or scabrous. *Leaves* alternate, erect, 6·0—15·0 mm. long, linear, channelled, acute, sparsely ciliate, glabrous above, glabrous or scabrous below. *Inflorescence* terminal, sub-umbellate, the pedicel shorter than the flowers, the flowers pink or magenta. Bract and bracteoles 3, ovate or lanceolate, apiculate, glabrous, ciliate. Outer *sepals* 3·0—4·0 mm. long, ovate, obtuse, glabrous, ciliate: inner sepals 8·5—10·0 mm. long, almost symmetrical, obtuse, very shortly apiculate, glabrous. Side *petals* 3·0—3·5 mm. long, obtuse, almost entire but with a short finger-like process on the anterior side near the apex. *Carina*, including crest, about 8·0 mm. long, the claw shorter than the limb, the crest penicillate, of medium size. *Style* flattened, ribbon-like, twisted, bending upwards, the anterior style branch small or lacking, the posterior beak-like, with the *stigma* along the lower edge. *Capsule* obovate, with a marginal rim. *Seed* broadly ellipsoidal, hairy.

P. ericaefolia occurs at low elevations in sandy places not far from the coast.

The type of this species is Burchell 5614, not 5514 as given in error by De Candolle. According to the late Dr. H. G. Fourcade Burchell 5514 is a species of *Othonna*. A paratype is in the Bolus Herbarium.

George. Wilderness, *Levyns* 5601, 9153, 9154.

Knysna. Groen Vlei, *Burchell* 5653: *Compton* 261. Knysna, *Burchell* 5614. Plettenberg Bay, *Schlechter* 5938.

Humansdorp. Seashore near Eerste River, *Fourcade* 2363.

Port Elizabeth. Near Humewood, *Holland* 3711.

16. **Polygala meridionalis** Levyns nom. nov. *P. pauciflora* Schlechter Engl. Jahrb. XXVII, 164 (1899): non Thunb. (1800). (Fig. 9, A–E.)

The name *P. oligantha* in Schlechter's handwriting, appears on a sheet at Kew (Bolus 8521). This name was never published and is not used here as it had been employed earlier by Richard for an Abyssinian species.

An erect or decumbent undershrub, closely leafy, scantily branched, erect, glabrous, up to 70 cm. high. *Leaves* alternate, 5·0—20·0 mm. long, erect, linear, acute, coriaceous, channelled above, minutely ciliate. *Inflorescence* terminal, umbellate, the pedicels slender, the flowers magenta, pink or almost white. Bract and bracteoles 3, lanceolate, acute, glabrous, very shortly ciliate. Outer *sepals* 4·5—6·0 mm. long, glabrous, acute or acuminate: inner sepals 9·0—11·0 mm. long, more or less symmetrical, apiculate, glabrous, the veins anastomosing. Side *petals* 4·0—5·5 mm. long, oblong, widening slightly towards the entire or very shortly lobed obtuse apex. *Carina*, including crest, 7·5—9·0 mm. long, the claw a little shorter than the limb, the crest penicillate, large. *Style* flattened, except at the bend near the middle, the anterior style branch small, the posterior long, rather slender, with a groove above, the *stigma* terminal or subterminal. *Capsule* oblong, with a narrow marginal rim. *Seed* ellipsoidal, densely hairy.

P. meridionalis is never found very far from the coast.

Lectotype. Schlechter 9649 in the Bolus Herbarium.

Cape. Cape Peninsula, *Eames*. Smith's Farm, Cape Point, *Salter* 1802. Buffels Bay, *Edwards*.

Caledon. Rooi Els, *Compton* 20074. Gansbaai, *Leighton* 1875. Frikkiesbaai, *Leighton* 1912.

Bredasdorp. Near Elim, *Schlechter* 9649: *Bolus* 8521. Brandfontein, *Esterhuysen* 19072, 19195. Cape Agulhas, *Leipoldt* 3164. Voelvlei, *Levyns* 8651. Road to Skipkop, *Levyns* 9719. Near Arniston, *Levyns* 9721. Near Bredasdorp, *Esterhuysen* 19122: *Levyns* 4486, 8648.

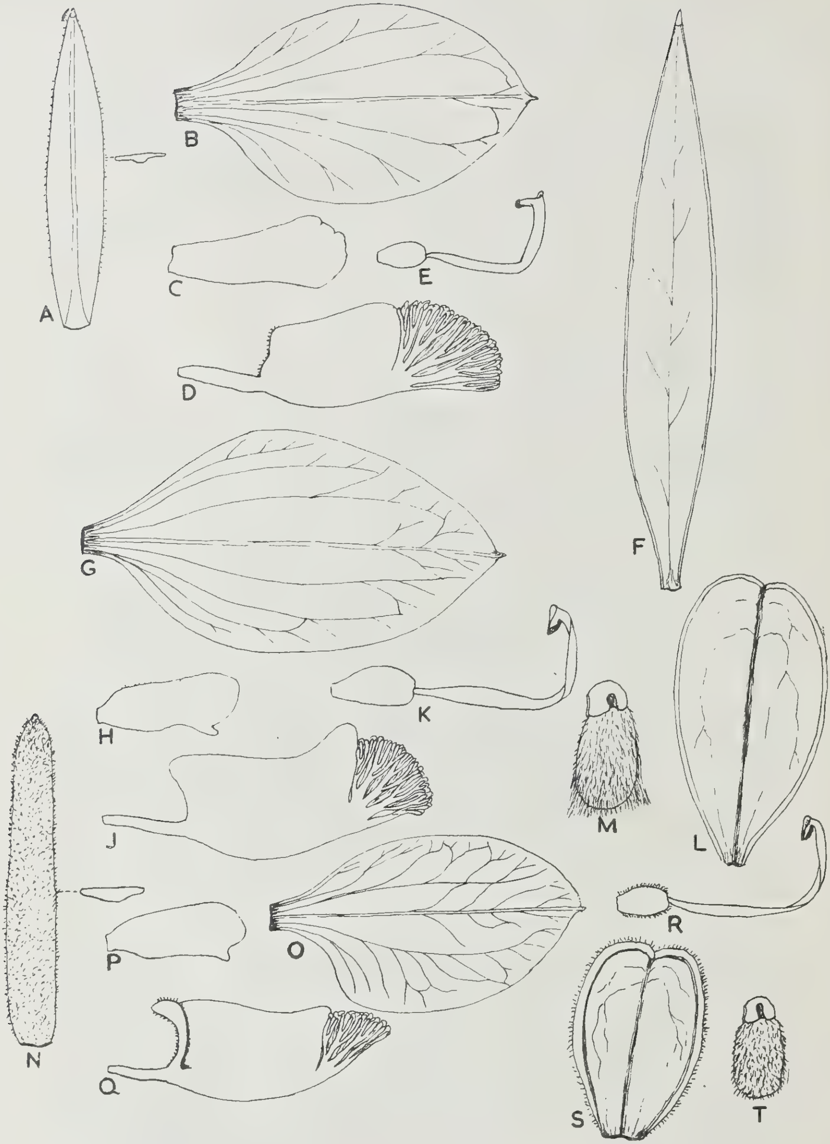

Fig. 9. *P. meridionalis* Levyns (A—E): A, leaf with cross section; B, inner sepal: C, side petal; D, carina; E, gynaecium. *P. langebergensis* Levyns (F—M); F, leaf; G, inner sepal; H, side petal; J, carina; K, gynaecium; L, capsule. M, seed. *P. dasyphylla* Levyns (N—T): N, leaf with cross section; O, inner sepal; P, side petal; Q, carina; R, gynaecium; S, capsule; T. seed. × 5.

17. **Polygala langebergensis** Levyns sp. nov. (Fig. 9, F–M.)

Suffrutex dense foliosus, parum ramosus. Folia erecta linearia acuminata, subtus nervo medio prominenti. Inflorescentia terminalis, subumbellata. Flores 8·5—10·0 mm. longi, breviter pedicellati. Sepala exteriora ovata acuta, minute ciliata. Petala lateralia oblonga obtusa, circa medium constricta, margine anteriore appendiculo brevi induta. Carina (crista inclusa) circa 10·0 mm. longa. Stylus complanatus, circa medium curvatus.

Suffruticose, closely leafy, up to 70 cm. high, sparingly branched, glabrous, with a stiff erect habit. *Leaves* alternate, 10·0—25·0 mm. long, linear acuminate, with a narrow translucent margin, the midrib prominent below. *Inflorescence* terminal, subumbellate, the pedicels shorter than the flowers, the flowers pale pink or almost white. Bract and bracteoles 3, lanceolate, acute, ciliate. Outer *sepals* 5·0—7·0 mm. long, ovate, acute, glabrous, minutely ciliate: inner sepals 11·0—13·0 mm. long, more or less symmetrical, apiculate, the slender veins anastomosing slightly. Side *petals* 4·0—4·5 mm. long, oblong with a constriction near the middle, obtuse with a short finger-like process on the anterior side. *Carina*, including crest, about 10·0 mm. long, the claw shorter than the limb, the limb somewhat elevated near the tip, the crest penicillate, of medium size. *Style* flat, ribbon-like, twisted, bent near the middle, the style branches grooved above, the anterior small, the posterior with the *stigma* along the lower edge. *Capsule* obovate, with a somewhat thickened marginal rim. *Seed* ellipsoidal, densely hairy.

The only known locality of *P. langebergensis* is Garcias Pass where it is plentiful on the slopes above the road.

Type. *Levyns* 8988 in the Bolus Herbarium.

Riversdale. Garcias Pass, *Levyns* 2745, 8988: *Bolus* (11207 in Herb. Bol.): *Leipoldt* (16047 in Herb. Bol.).

18. **Polygala dasyphylla** Levyns sp. nov. (Fig. 9, N–T.)

Suffrutex decumbens foliosus hispidus. Folia sessilia linearia vel lineari-lanceolata, 5·0—15·0 mm. longa, potius crassa. Inflorescentia intercalaris. Flores circa 10·0 mm. longi, pedicelli hispidi quam flores breviores. Sepala exteriora ovata apiculata glabra ciliata interdum nervo medio paulo hispido. Petala lateralia circa 4·5 mm. longa, obtussima apicem versus lateriora, saepe appendiculo brevissimo margine anteriore induta. Carina (crista inclusa) circa 8·5 mm. longa. Stylus circa medium curvatus, complanatus tortilis. Capsula oblonga, margine villosa. Semen hirsutum.

A small decumbent leafy hispid undershrub, the branches up to 20 cm. long. *Leaves* alternate, sessile, linear or linear-lanceolate. 5·0—15·0 mm. long, rather thick, flattened but becoming somewhat triangular in section near the apex, hispid, sometimes with the upper surface nearly glabrous. *Inflorescence* intercalary, the growing point giving rise to a leafy shoot beyond the flowers, the hispid pedicels a little shorter than the flowers: the flowers mostly pale, the carina deep pink. Bract and bracteoles 3, lanceolate, hispid, deciduous. Outer *sepals* 3·5—4·5 mm. long, ovate, shortly apiculate, glabrous except for a few hairs on the midrib, ciliate: inner sepals 9·5—10·5 mm. long, more or less symmetrical, apiculate, glabrous. Side *petals* about 4·5 mm. long, very obtuse, widest in the upper half, often with a small finger-like outgrowth on the anterior side, slightly constricted just below the middle. *Carina*, including crest, about 8·5 mm. long, the claw shorter than the limb, the margin of the limb nearest the claw thickened, with short hairs outlining the thickened part, the base of the limb slightly more elevated than the tip: the crest penicillate, of medium size. *Style* bent near the middle, ribbon-like, twisted in the upper half, the anterior style branch small, the posterior larger, grooved above, the *stigma* along the under edge. *Capsule* oblong, with a narrow marginal rim outlined with rather long hairs. *Seed* ellipsoidal, densely hairy, the lobes of the caruncle small and broad.

P. dasyphylla has been recorded from a restricted locality in the Bredasdorp Division. It occurs on sandy soil derived from limestone.

Type. *Levyns* 9763 in the Bolus Herbarium.

Bredasdorp. Near Baardschierdersbosch, *Levyns* 9763. Strandkloof, *Levyns* 8653.

19. **Polygala affinis** DC. Prod. I 322 (1824): E. & Z. Enum. 22 (1834): Harvey in Harv. & Sond. Fl. Cap. I, 88 (1859–60). *P. burmanni* DC. l.c. 322: E. & Z. l.c. 21. (Fig. 10, A–J.)

Suffruticose, sometimes almost herbaceous, decumbent, branching mainly near the base, pilose or tomentose. *Leaves* alternate, 6·0—25·0 mm. long, very shortly petiolate, linear or lanceolate, more or less revolute, obtuse or subacute, pilose or pubescent. *Inflorescence* racemose, lateral, lying opposite a leaf, the pedicels shorter than the flowers, both peduncles and pedicels pilose or tomentose: the flowers usually pink. Bract and bracteoles 3, lanceolate, acute pilose. Outer *sepals* 2·0—3·0 mm. long, ovate, obtuse, villous, sparsely villous or almost glabrous: inner sepals 5·5—6·5 mm. long, elliptic-ovate, obtuse, sometimes apiculate, glabrous or with a few short hairs near the midrib at the apex and at the base. Side *petals* 3·5—4·0 mm. long, obovate or oblong, slightly constricted near the middle, shortly and more or less equally bilobed. *Carina*, including crest, 5·0—6·0 mm. long, the claw shorter than the limb, the crest penicillate, of medium size or large. *Style* bent near the middle, ribbon-like, twisted, the style branches grooved above, the anterior small or lacking, the posterior larger, with the *stigma* along the lower edge. *Capsule* broadly obovate, with a wide rim, glabrous or with long hairs along the margin. *Seed* ellipsoidal, densely pilose, the caruncle with well developed membranous lobes of variable length, in extreme cases the lobes as long as the seed (Fig. 10, G—J).

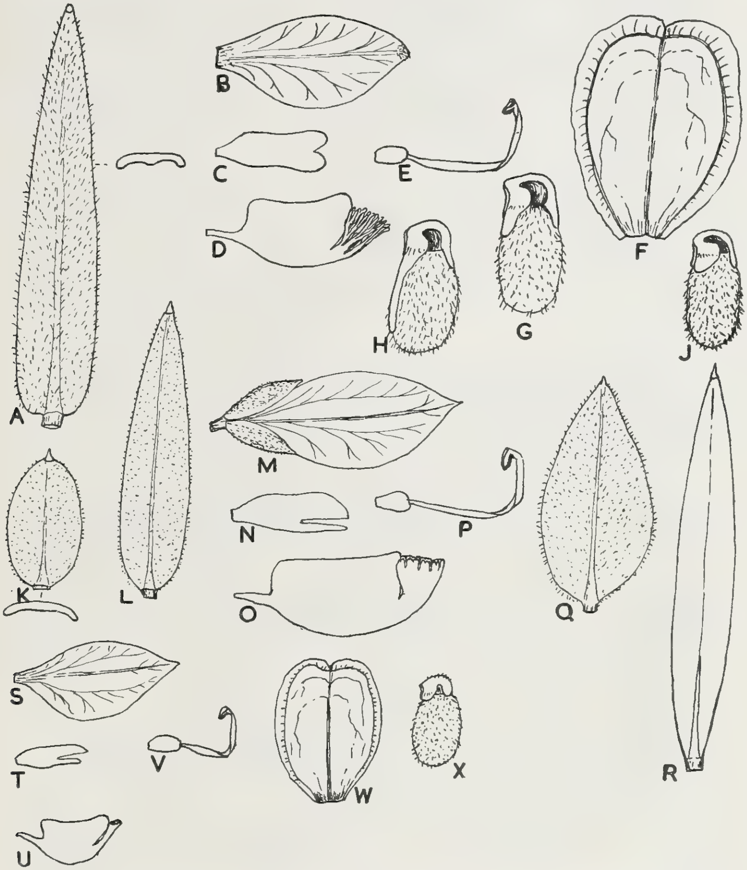

Fig. 10. *P. affinis* DC. (A—J): A, leaf with cross section; inner sepal; C, side petal; D, carina; E, gynaecium; F, capsule (from the Roggeveld); G, seed (Roggeveld); H, seed (Ladismith); J, seed (Napier). *P. brachyphylla* Chodat (K—P): K, typical leaf with cross section; L, a less common form of leaf; M, side view of calyx; N, side petal; O, carina; P, gynaecium. *P. lehmanniana* E. & Z. (Q—X): Q, less common form of leaf; R, common leaf form; S, inner sepal; T, side petal; U, carina; V, gynaecium; W, capsule; X, seed. × 5.

This species has a wide and discontinuous distribution, ranging from sea-level to 1,400 metres.

Namaqualand. Spektakel, *Esterhuysen* 5735: *Bolus* 6664. Kamieskroon, *Salter* 831: *Esterhuysen* 5451: 3 miles from Leliefontein, *Leipoldt* 3159. Brakdam, *Lewis* (61153 in S. Af. Mus.). Bowesdorp, *Stokoe* (61522 in S. Af. Mus.).

Van Rhynsdorp. Nieuwoudtville, *Lavis* (19841 in Herb. Bol.).

Clanwilliam. Between Clanwilliam and Citrusdal, *L. Bolus*. Between Greys Pass and Graafwater, *Leipoldt* 3161.

Piketberg. Kapiteins Kloof, *Levyns* 9417. Piquetberg, *Bodkin* (13523 in Herb. Bol.): *Esterhuysen* 5517: *Edwards* 206. De Hoek, *Lewis* (62684 in S. Af. Mus.).

Tulbagh. Winterhoek, *Ecklon & Zeyher*. Tulbagh, *Esterhuysen* 17476.

Worcester. Eendragt, *Levyns* 7987. Keeromsberg, *Esterhuysen* 9180. Fonteinjesberg, *Esterhuysen* 16720.

Malmesbury. Near Mamre, *Bolus* 4245. Malmesbury, *Bachmann*. Riebeeck Kasteel, *Esterhuysen* 20422. Darling, *Bolus* (12608 in Herb. Bol.).

Cape. Tygerberg, *Levyns* 3138.

Paarl. Agter Paarl, *Esterhuysen* 20437. Phesante Kraal, *Levyns* 8956.

Stellenbosch. Sir Lowrys Pass, *Schlechter* 1109.

Caledon. Caledon, *G. van Niekerk* 264. Near Villiersdorp, *Leipoldt* 3198.

Bredasdorp. Napier, *Levyns* 8559: 8649: *Esterhuysen* 3049.

Robertson. Robertson, *Levyns* 4350. Near McGregor, *Levyns* 9209.

Montagu. Montagu, *Levyns* 8856, 8043, 10089. Dobbelaars Kloof, *Levyns* 6712.

Swellendam. Bonnievale, *Compton* 3427.

Ladismith. Ladismith, *Levyns* 2063, 7406, 8965, 9120. Near van Wyksdorp, *Levyns* 2744.

Laingsburg. Matjesfontein, *Compton* 3220.

Sutherland. Roggeveld near Middelpost, *Levyns* 9473.

Oudtshoorn. Cango Caves, *J. Gillett* 1677: *Rogers* 4644.

Uniondale. Laudina, Kammanassie Mountains, *Esterhuysen* 16490.

Cradock. Near Mortimer, *Bolus* 9256.

20. **Polygala brachyphylla** Chodat Mem. Soc. Phys. Genève 31. 417 (1893). *P. brevifolia* Harvey in Harv. & Sond. Fl. Cap. I, 90 (1859–60): non Nutt. (1818). (Fig. 10, K–P.)

Suffruticose, rigid, spreading, divaricately branched, the tips of the branches sometimes spiny, 35 cm. high or less, the branches angled, hispid when young, becoming scabrous. *Leaves* 2·0—10·0 mm. long, alternate, somewhat distant, almost sessile, oblong, linear or lanceolate, slightly revolute or flat, obtuse or subacute, apiculate, hispid or scabrous above and below. *Inflorescence* few flowered, lateral, standing almost at right angles to the stem, the peduncles stout, angled, scabrous, the pedicels much shorter than the pink or almost white flowers. Bract 1, persistent, lanceolate, acuminate; bracteoles 2, deciduous, falling before the bud matures, similar to the bract but smaller. Outer *sepals* 2·0—3·0 mm. long, ovate, acute, shortly hispid, ciliate; inner sepals about 7·0 mm. long, slightly asymmetrical, apiculate, glabrous. Side *petals* 3·5—4·0 mm. long, bilobed, the lobes about equal in length, the anterior much narrower than the posterior. *Carina*, including crest, about 6·5 mm. long, the claw much shorter than the limb, the crest entire below, shortly lobed or folded near the top, never penicillate. *Style* flattened, ribbon-like, twisted, bent near the middle, the anterior style branch lacking, the posterior narrow, asymmetrically placed, the *stigma* along the lower edge. Ripe capsules not observed: immature capsule much like that of *P. lehmanniana* E. & Z.

P. brachyphylla is confined to the lower and middle slopes of mountains, from 300 to 900 metres.

Clanwilliam. Pakhuis Pass, *Leipoldt* 3985: *Levyns* 7213, 9455. Clanwilliam, *Leipoldt* 597, 4382. Algeria, *Lewis: Taylor* 2942. Nieuwoudt Pass, *Esterhuysen* 7156: *Salter* 5067. Middleberg, *Esterhuysen* 7284. Grootberg, *Esterhuysen* 4157. Near Citrusdal, *Levyns* 9253. Elands Kloof Mission Station, *Levyns* 5743.

21. **Polygala lehmanniana** E. & Z. Enum. 23 (1834): Harvey in Harv. & Sond. Fl. Cap. I, 89 (1859–60). Levyns in Adamson & Salter, 544 (1950). (Fig. 10 Q–X.)

P. carmichaelii Harvey l.c. 19* (in the addendum), is probably this species though Harvey's specimen has not been seen. The description fits this species reasonably well in all respects but the crested keel. *P. lehmanniana* shows considerable variation in the size of its undivided crest.

A small leafy undershrub, almost herbaceous, erect or decumbent, up to 30 cm. high, branching mainly near the base, glabrous or pubescent. *Leaves* alternate, 5·0—14·0 mm. long, very shortly petiolate, linear, linear-lanceolate or ovate, acute, the midrib visible, usually glabrous, sometimes pubescent. *Inflorescence* few to several flowered, lateral, standing more or less at right angles to the stem, racemose, the pedicels shorter than the pink flowers. Bract 1, lanceolate, acute, hispid, persistent: bracteoles 2, similar to but smaller than the bract, deciduous. Outer *sepals* 2·3—2·7 mm. long, ovate, acute, shortly ciliate near the apex, otherwise glabrous: inner sepals 4·5—5·5 mm. long, symmetrical, acute. Side *petals* 2·5—3·0 mm. long, bilobed, the posterior lobe much broader and slightly longer than the anterior. *Carina*, including crest, 3·4—4·7 mm. long, the claw shorter than the limb, the crest entire variable in size. *Style* flattened, ribbon-like, twisted, bent near the middle, the anterior style branch lacking, the posterior narrow, asymmetrical, grooved above, the *stigma* along the lower edge. *Capsule* obovate, with a narrow marginal rim, glabrous. *Seed* densely hairy, the lobes of the caruncle short and broad.

P. lehmanniana occurs from sea-level to 1,500 metres.

Clanwilliam. Tafelberg, Cedarberg, *Esterhuysen* 18164. Pakhuis Pass, *Esterhuysen* 15369. Olifants River Mountains, *E. L. Stephens* 7212: *Esterhuysen* 15296, 15368. Keerom, *Esterhuysen* 17914.

Piketberg. Twenty-Four Rivers, *Esterhuysen* 16166.

Ceres. Castle Rocks, *Esterhuysen* 20700. Near Ceres, *Bolus* 8364: *Levyns* 4655. Michells Pass, *Bolus* 5313.

Worcester. Prospect Peak, *Esterhuysen* 15853. Du Toit's Kloof, *Esterhuysen* 15811, 16071: *Levyns* 8620. Waabooms River, *Esterhuysen* 14826. Waaihoek, *Esterhuysen* 15062.

Cape. Table Mountain above Llandudno, *Esterhuysen* 19244. Kirstenbosch, *Esterhuysen* 15842. Rondebosch, *Levyns*. Chapman's Peak, *Levyns* 5865.

Bredasdorp. Near Elim, *Bolus* 8520.

22. **Polygala ludwigiana** E. & Z. Enum. 23 (1834): Harvey in Harv. & Sond. Fl. Cap. I, 89 (1859–60). (Fig. 11, A–F.)

A small glabrous branched undershrub, almost herbaceous with somewhat distant erect leaves, erect or decumbent, the branches up to 50 cm. long. *Leaves* alternate, 6·0—22·0 mm. long, linear, acute, flat or channelled above, sessile or almost so. *Inflorescence* with few or several flowers, lateral, the peduncles standing more or less at right angles to the stem: the pedicels shorter than the pink flowers. Bract 1, lanceolate, acute, hispid, persistent: bracteoles 2, similar but smaller, deciduous. Outer *sepals* 2·5—3·0 mm. long, ovate, acute, glabrous, usually shortly ciliate near the apex: inner sepals 6·0—7·0 mm. long, more or less symmetrical, acute. Side *petals* about 4·0 mm. long, obtuse, very shortly and unequally bilobed, widest just above the middle. *Carina*, including crest, 5·5—6·0 mm. long, the claw a little shorter than the limb, the crest small, entire, usually not reaching to the top of the carina. *Style* flattened, somewhat ribbon-like, bent a little above the middle, the anterior style branch short, the posterior longer with a terminal *stigma*, with a basin-like depression above the style branches. *Capsule* oblong-ovoid, glabrous, with a narrow marginal rim. *Seed* densely hairy, the lobes of the caruncle short and broad.

P. ludwigiana occurs on mountain slopes up to about 1,200 metres.

Calvinia. Nieuwoudtville, *Bolus* 9371.

Clanwilliam. Near Middleberg Hut, *Barnes* (19314 in Herb. Bol.). Grasruggens, *Pillans* 8809. Pakhuis Pass, *Levyns* 7226. Olifants River Mountains, *Esterhuysen* 15342. Elands Kloof Mission Station, *Levyns* 5734.

Piketberg. Muis Hoek Berg, *Pillans* 8596. Hills between Witte Els Kloof and Lamberts Hoek Berg, *Pillans* 9079. The Rest, *Gillett* 3735. Piquetberg, *Guthrie* 2549. De Hoek, *Compton* 19945. Hills N.W. of Moutons Vlei, *Pillans* 7331.

Tulbagh. Near Gouda, *Esterhuysen* 18793.

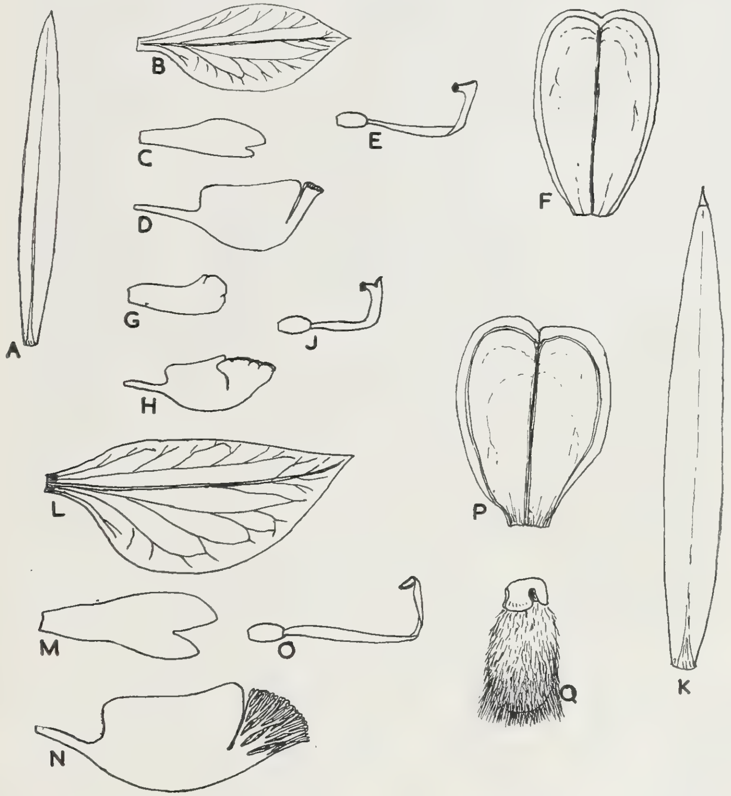

FIG. 11. *P. ludwigiana* E. & Z. (A—F): A, leaf; B, inner sepal; C, side petal; D, carina; E, gynaecium; F, capsule. *P. parkeri* Levyns (G—J): G, side petal; H, carina; J, gynaecium. *P. refracta* DC. (K—Q): K, leaf; L, inner sepal; M, side petal; N, carina; O, gynaecium; P, capsule; Q, seed. × 5.

23. **Polygala parkeri** Levyns sp. nov. (Fig. 11, G–J.)

Named in honour of R. H. Parker whose careful study of the vegetation around Somerset West has contributed much to our knowledge of the flora of that district.

Suffrutex foliosus glaber erectus vel decumbens, 20·0—30·0 cm. altus. Folia 5·0—18·0 mm. longa, linearia acuta. Inflorescentia lateralis patens. Sepala glabra apiculata. Petala lateralia oblonga, circa 3·0 mm. longa, apice undulata. Carinae limbus vix quam unguiculus longior: crista magna, flabelliformis. Stylus curvatus circa medium, vix complanatus. Stigma terminale.

A small leafy glabrous undershrub, 20—30 cm. high, almost herbaceous, erect or spreading, branching near the base, the stems somewhat angled. *Leaves* alternate, 5·0—18·0 mm. long, erect, linear, acute, apiculate, flat or channelled above, sessile or nearly so. *Inflorescence* with few or several flowers, lateral, at right angles to the stem or deflexed, the pedicels shorter than the pink flowers. Bract 1, lanceolate-ovate, acute, ciliate, persistent: bracteoles 2, slightly smaller than the bract, deciduous. Outer *sepals* about 2·3 mm. long, ovate, glabrous, apiculate: inner sepals about 6·0 mm. long, asymmetrical, apiculate. Side *petals* about 3·0 mm. long, more or less oblong, the apex obtuse, undulate, entire or nearly so. *Carina*, including the crest, about 4·5 mm. long, the claw not much shorter than the limb, the crest almost as large as the limb, undivided for the greater part of its length, with a few very short lobes at the top. *Style* bent near the middle, not much flattened, the anterior style branch well developed, acute, the posterior style branch slightly longer than the anterior, grooved above, with a terminal *stigma*. Ripe capsule unknown.

P. parkeri is closely related to *P. ludwigiana* from which it differs in the shape of the side petals, in the much larger crest and in the scarcely flattened style.

Type. *Parker* 4282 in the Bolus Herbarium.

Paarl. French Hoek Pass, *Esterhuysen* 2874: *Schlechter* 9310.
Stellenbosch. Somerset West, *Parker* 4282. Sir Lowrys Pass, *Guthrie* 2781: *Salter* 1836. Helderberg, *Esterhuysen* 14625.

24. **Polygala refracta** DC. Prod. I 323 (1824): Harvey in Harv. & Sond. Fl. Cap. I, 89 (1859–60): Levyns in Adamson & Salter Fl. Cap. Penin. 545 (1950). *P. harveyana* Chodat Mem. Soc. Phys. Genève XXXI 412 (1893). (Fig. 11, K–Q.)

P. refracta DC. is based on Burchell 4891 collected in the Lange Kloof near Joubertina. *P. harveyana* Chodat is based on Burchell 6058 from the neighbourhood of George. Burchell 6058 is at Kew and consists of a mixture of two species. The two left-hand specimens are *P. garcini* DC., while the remainder are *P. refracta* DC. Chodat's drawing indicates that he based *P. harveyana* on the latter.

A slender plant, woody at the base only, herbaceous elsewhere, glabrous, growing among and usually partly supported by the surrounding vegetation. Branches angled, the leaves never crowded. *Leaves* alternate, 6·0—25·0 mm. long, linear, acute, often with a narrow translucent margin, more or less erect, sessile. Inflorescence with few to several flowers, lateral, the peduncle almost at a right angle to the stem: the pedicels slender, occasionally almost as long as the pink flowers. Bract 1, ovate-lanceolate, acute, deciduous: bracteoles 2, similar to the bract but smaller, deciduous. Outer *sepals* 2·5—3·0 mm. long, ovate, glabrous, acute: inner sepals 9·0—10·0 mm. long, asymmetrical, acute. Side *petals* 5·3—5·7 mm. long, unequally bifid, widest in the upper half. *Carina*, including the crest, 8·3—8·8 mm. long, the claw shorter than the limb, the crest penicillate, ample. *Style* ribbon-like, twisted, with a bend a little above the middle, the anterior style branch lacking, the posterior flattened, oblique, with the *stigma* along the lower edge. *Capsule* broadly obovoid, glabrous, with a narrow marginal rim. *Seed* densely hairy, the caruncle with short membranous lobes.

P. refracta occurs from sea-level to 1,800 metres.

Clanwilliam. Cedarberg, *Esterhuysen* 7319.

Ceres. Tafelberg, *Esterhuysen* 3894.

Cape. Steenberg, *Wolley Dod.* Table Mountain, *Bolus* 4641: *Wolley Dod* 815. Near Theefontein, *Levyns* 8785. Bonteberg, *Levyns* 9275.

Paarl. French Hoek Forest Reserve, *Compton* 12975.

Caledon. Paardeberg near Elgin, *Levyns* 8766. Houw Hoek, *Schlechter* 9416. Near Greyton, *Esterhuysen* 20759.

Swellendam. Lemoen Hoek Peak, *Walgate* 931. Tradouw Pass, *Schlechter* 2080.

George. Near George, *Burchell* 6058 (partly).

Humansdorp. Kareedouw Pass, *Fourcade* 1110.

Uniondale. Lauterwater, *Compton* 4576. Smutsberg, *Esterhuysen* 10795a. Near Joubertina, *Esterhuysen* 13629, 16364.

Uitenhage. Van Stadens River Mountains, *Bolus* 228. Witte Klip, *E. West* 380.

Albany. Grahamstown, *Rennie* 187.

Victoria East. Mitchells Pass, *Esterhuysen* 13244.

25. **Polygala pappeana** E. & Z. Enum. 23 (1834). *P. refracta* DC. var. *squamifolia* Chodat Mem. Soc. Phys. Genève XXXI, 412 (1893).

P. macra Harvey in Harv. & Sond. Fl. Cap. I, 89 (1859–60): non DC. (1824). *P. restiacea* nom. nud. E. Mey. in Drege Zwei Pfl. Doc. 80 (1843). (Fig. 11, A–F.)

A straggling slender glabrous herb, slightly woody at the base, growing intertwined amongst other plants: the branches angled. *Leaves* alternate, 2·0—8·0 mm. long, scale-like and inconspicuous, linear or subulate, acute, more or less adpressed. *Inflorescence* few flowered, lateral, the peduncle standing more or less at right angles to the stem: the slender pedicels as long as or a little shorter than the flowers. Bract 1, lanceolate, acuminate, glabrous, deciduous: bracteoles 2, similar to the bract but smaller, deciduous. Outer *sepals* 1·0—2·0 mm. long, ovate, acute, glabrous: inner sepals 6·0—7·0 mm. long, acute, asymmetrical. Side *petals* about 3·3 mm. long, widest just above the middle, bilobed almost to the middle, the posterior lobe wider and slightly longer than the anterior. *Carina*, crest included, about 5·5 mm. long, the claw shorter than the limb, the crest penicillate, the segments free almost to the base. *Style* bent near the middle, flattened, ribbon-like, twisted, the anterior branch small or lacking, the posterior grooved above, the *stigma* along the lower edge. *Capsule* obcordate, with a narrow marginal rim. *Seed* hairy, the lobes of the caruncle short and broad.

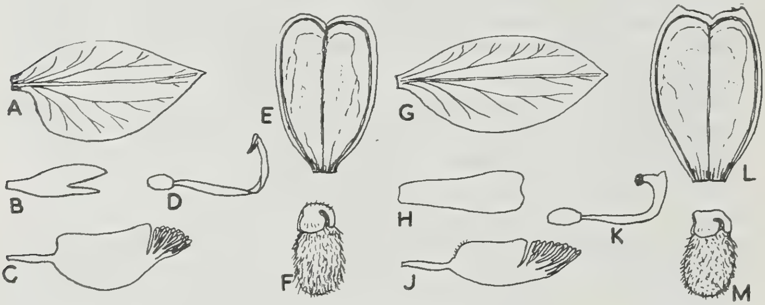

Fig. 12. *P. pappeana* E. & Z. (A—F): A, inner sepal; B, side petal; C, carina; D, gynaecium; E, capsule; F, seed. *P. nematocaulis* Levyns (G—M): G, inner sepal; H, side petal; J, carina; K, gynaecium; L, capsule; M, seed. × 5.

P. pappeana is confined to marshy spots from near sea-level to about 1,200 metres.

Ceres. Near Tandfontein, Cold Bokkeveld, *Schlechter* 10145. Elands Kloof, *Levyns* 8116, 9362.

Piketberg. Between Avontuur Hill and Zebra Kop, *Pillans* 7376.

Tulbagh. De Hoek, *Levyns* 5692.

Paarl. Suurvlakte, *Esterhuysen* 21114. Haalhoek Sneeuwkop, *Ester-*

huysen 15155. French Hoek Pass, *M. C. Gillett.*
Caledon. Somerset Sneeuwkop, *Esterhuysen* 2602.

26. **Polygala nematocaulis** Levyns sp. nov.

P. pappeana auct. non E. & Z., Levyns in Adamson & Salter Fl. Cap. Penin. 545 (1950). (Fig. 12, G–M.)

Herba gracilis glabra. Folia minuta adpressa remota. Inflorescentia lateralis, floribus paucis. Sepala exteriora 1·0—2·0 mm. longa, ovata, acuta: sepala interiora 6·0—7·0 mm. longa. Petala lateralia fere 4·0 mm. longa, prope apicem latiora, breviter biloba. Carina (crista inclusa) fere 5·5 mm. longa. Carinae limbus quam unguiculus paulo longior, crista basi conjuncta. Stylus complanatus tortilis circa medium curvatus. Capsula obcordata margine angusto. Semen pilosum.

A slender glabrous herb, with the vegetative features, inflorescence and bracts of *P. pappeana* E. & Z. Outer *sepals* 1·0—2·0 mm. long, ovate, acute, glabrous: inner sepals 6·0—7·0 mm. long, symmetrical or nearly so. Side *petals* about 4·0 mm. long, widest near the apex, shortly bilobed, the rounded lobes not very dissimilar. *Carina*, crest included, about 5·5 mm. long, the claw not much shorter than the limb, the crest almost as long as the limb, the narrow segments united for about half their length. *Style* bent near the middle, not much flattened, the anterior style branch small, erect, the posterior larger, more or less at right angles to the style, the *stigma* terminal. *Capsule* obovate, glabrous, with a narrow marginal rim and two tooth-like processes at the apex. *Seed* hairy, the lobes of the caruncle short and broad.

P. nematocaulis is confined to marshy spots from sea-level to about 600 metres.

Type. *Levyns* 8767 in the Bolus Herbarium.

Cape. Near Smitswinkel Bay, *Levyns* 5949. Orange Kloof, *Wolley Dod* 2527. Smitswinkel Bay, *Levyns.*
Caledon. Houw Hoek, *Guthrie* 2222. Steenbras Siding, *Levyns* 8767. Viljoens Pass, *Salter* 4043. Mossel River, *L. Guthrie.*

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A NEW ALOE FROM THE BELGIAN CONGO.

By G. W. Reynolds.

(With Plate II.)

Aloe Hendrickxii Reynolds. Species nova in Sect. *Prolongatae: A. Schweinfurthii* Bak. et *A. Sereti* De Wild. affinis, sed omnibus partibus minoribus facile distinguitur.

Planta parva, succulenta, brevissime caulescens, caespitosa.

Folia ca. 16, rosulata, patentia, anguste lanceolato-attenuata, ca. 20 cm. longa, 3·5 cm. lata, immaculata, dentibus marginibus pallidis 3 mm. longis, 5—8 mm. distantibus armata. *Inflorescentia* saepe simplex, 25—30 cm. alta. *Racemus* ca. 10 cm. longus. *Bracteae* deltoideae, 14 mm. longae, 3—4 mm. latae, scariosae, 3—5-nervatae. *Pedicelli* 30 mm. longi. *Perigonium* pallide coccineum, cylindraceo-trigonum, 30 mm. longum, circa ovarium 4·5 mm. diam.; *segmenta exteriora* per 10 mm. libera. *Antherae* 2 mm. exsertae. *Stigma* demum 3 mm. exsertae. *Ovarium* 5 mm. longum, 2 mm. diametro. (Plate II.)

Belgian Congo: Oriental Province, Kibali—Ituri Dist., Mont Aboro, alt. 2,450 met., 2° N., 30° 52′ E., coll. F. L. Hendrickx (n. 6401 Bot.), cult. Johannesburg, fl. 12 March 1955, Reynolds 6300 holotype (PRE), isotype (BR).

This distinctive new species was first collected by Mr. Fred L. Hendrickx, Director of the I.N.E.A.C. Station de Mulungu—Tshibinda, which is near Bukavu, in the Kivu Province of the Belgian Congo. I have much pleasure in naming it after Mr. Hendrickx to whom I am greatly indebted for specimens, and also for a number of Aloe plants from several other localities in the Congo, and in Ruanda—Urundi.

Mr. Hendrickx discovered this new species in October 1951 on the summit of Mont Aboro which is the highest point of the ridge bordering the western side of the Great Rift in which Lake Albert lies. Mont

Aboro is situated to the north of Kwandruma, at 2° 00′ N., 30° 52′ E. Plants were found at an altitude of 2,450 metres, growing in small groups in fissures of granite outcrops.

A. Hendrickxii is a small under-shrub of compact low growth, and appears to be nearest allied to *A. Sereti* De Wild, and *A. Schweinfurthii* Bak. The former I have seen near Irumu, and between Fataki and Nioka, while I have studied *A. Schweinfurthii* near Aba and elsewhere along the Sudan—Congo border, including the type locality Jebel Bangenze.

From both of these allies *A. Hendrickxii* differs in being a much smaller plant with smaller leaves and rosettes, and in having a much lower, mostly simple inflorescence averaging only 25—30 cm. in height. In all flowers I have seen, the perianth segment apices were markedly recurved to revolute.

The description is based on plants which flowered in Johannesburg in March 1954 and March 1955.

DESCRIPTION. A small shrub of low compact growth.

Stem none or very short, with numerous off-shoots forming small dense groups.

Leaves about 16, rosulate, narrowly lanceolate-attenuate, spreading, slightly recurved near apex, basally amplexicaul, 20 cm. long, 3·5 cm. broad; *upper surface* dull green with a greyish bloom, without spots and markings, slightly concave low down, a little channelled upwards; *lower surface* greyer-green than upper surface, rounded, mostly without spots or lines but sometimes with a few obscure dull-greyish elongated spots; *margins* armed with firm greenish-white teeth in lower half of leaf, the teeth brownish-tipped in upper half of leaf and averaging 3 mm. long, 5—8 mm. distant. *Sap* dries yellow.

Inflorescence mostly simple, 25—30 cm. tall, sometimes with 1—2 short branchlets.

Peduncle flattened and 6 mm. broad at base, about 4 mm. thick at the middle, clothed with 4—6 sterile-bracts, the lowest up to 18 mm. long, 5 mm. broad, thin, dry, 5—7-nerved, smaller upwards.

Raceme cylindric-conic, averaging 10 cm. long, subdensely flowered, unicoloured dull-scarlet, the apex a small tuft of wilted bracts, youngest buds suberect and greyish-tipped, open flowers subpendulous.

Bracts long-deltoid, lowest 14 mm. long, 3—4 mm. broad, subscarious, 5—7-nerved.

Pedicels lowest 13 mm. long, lengthening in the fruit.

Perianth dull-scarlet, 30 mm. long, cylindric, 4½ mm. diam. across the ovary, slightly decurved, the mouth wide open; *outer segments* free for 10 mm., obscurely 3-nerved, thinner at the edges, the apices subacute and much recurved to revolute; *inner segments* free but dorsally adnate to the outer for two-thirds their length, longer and broader than the outer, with thin white edges and a scarlet keel, distinctly brown-nerved on inside near apex, the apices markedly recurved to revolute.

Filaments pale lemon, filiform-flattened, the 3 inner narrower and lengthening before the 3 outer with their *anthers* in turn exserted 2—3 mm.

Stigma at length exserted 3 mm.

Ovary pale yellow-green, 5 mm. long, 2 mm. diam.

ACKNOWLEDGMENT.

I am indebted to the South African Council for Scientific and Industrial Research for a travelling grant which enabled me to investigate the Aloes of the eastern portion of the Belgian Congo in June—July 1954.

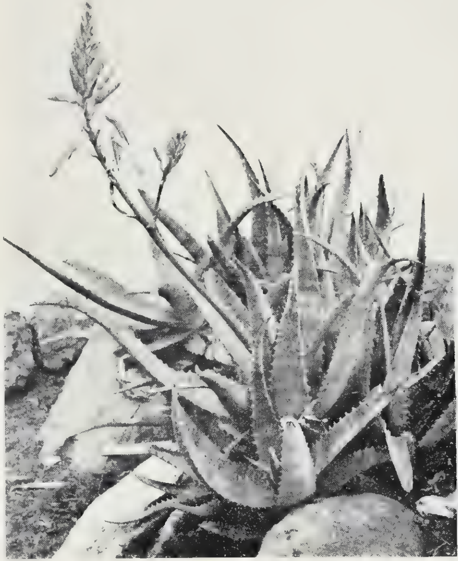
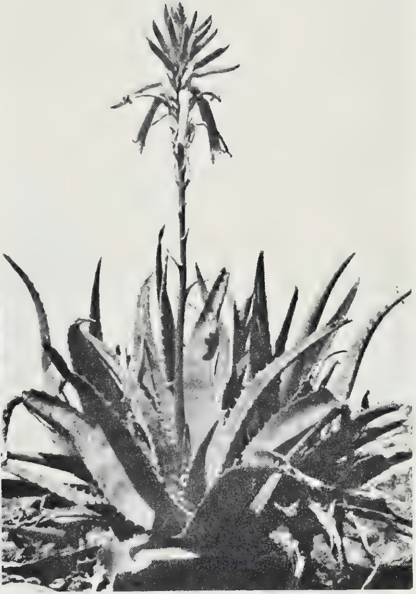


Fig. 1.



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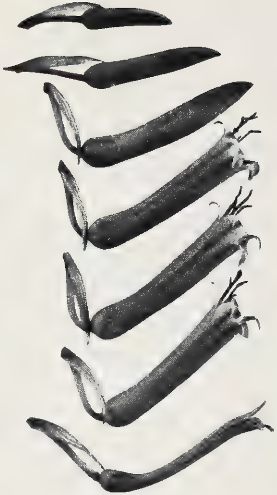

Fig. 3.

Plate II. *Aloe Hendrickxii* Reynolds.

Figs. 1, 2.—Plants collected by Mr. Fred L. Hendrickx on Mont Aboro, Kibali—Ituri District, Belgian Congo, cult. Johannesburg, fl. 12 March 1955. Height 40 cm.

Fig. 3.—Flowers 1/1 from bud to post-pollination stage.

A NEW ALOE FROM THE SUDAN.

By G. W. REYNOLDS.

(With Plates III and IV.)

Aloe MacLeayi Reynolds. Species nova in Sect. EUALOE, Subsect. *Grandes* pertinet; nulli alii arcte affinis.

Planta succulenta, acaulis. *Folia* ca. 24, dense rosulata, lanceolato-attenuata, viridia, 50 cm. longa, 12 cm. lata, patentia, eleganter arcuatim recurvata, profunde canaliculata; dentibus marginibus albidis 4 mm. longis, 8—15 mm. distandibus munita. *Inflorescentia* ca. 9-ramosa, 90 cm. alta. *Racemi* anguste conico-cylindracei, 22 cm. longi, basi 5·5 cm. diam. *Bracteae* parvae, breviter ovato-acutae, 3 mm. longae, 4 mm. latae, subscariosae, 3-nervatae. *Pedicelli* 10 mm. longi. *Perigonium* aurantium, cylindraceo-trigonum, 36 mm. longum, basi 7 mm. diam.; *segmenta exteriora* libera. *Antherae* per 1—2 mm. exsertae. *Stigma* demum 2—3 mm. exserta. *Ovarium* 7 mm. longum, 3 mm. diametro. (PLATES III and IV.)

A-E. Sudan: Equatoria, Imatong Mtns., near Gilo, *c.* 4° 10′ N., 32° 45′ E., 5,400 ft., Coll. Dr. K. N. G. MacLeay, cult. Johannesburg, fl. 28 Feb. 1954, Reynolds 6773, holotype (PRE), fl. 27 March 1955, isotype (K, EA).

Dr. K. N. G. MacLeay (Department of Botany, University College of Khartoum) first collected this new species in June, 1947, and again in January 1951, among rocks on a grassy bank above the road bridge over the River 'Ngairigi, near Gilo, in the Imatong Mountains, Equatoria Province of the Anglo-Egyptian Sudan. Dr. MacLeay found plants "frequent in secondary grassland, and from 5,000—8,000 ft., which roughly corresponds with the range of *Pteridium aquilinum* on the western side of the Imatongs."

A large plant received by air in January 1953, has grown well in Johannesburg where it flowered in February 1954, and again in March 1955.

The species is named after Dr. MacLeay to whom I am indebted for the plant, and also for several other Aloe plants from near the Red Sea, from the Nuba Mountains in Kordofan Province, and from the Acholi Hills, Loka West, and Tembura in the Equatoria Province of the Sudan.

A. MacLeayi is a most handsome acaulescent species with large deep-green unspotted leaves which are deeply channelled and gracefully recurved. The inflorescence is a large well-branched panicle 90 cm. high, and bears striking racemes of 36 mm. scarlet flowers.

The perianth segments are free to base, and clearly 3—5-nerved throughout. The buds are minutely spotted which is a character found in

A. secundiflora Engler, but the latter has oblique racemes with flowers secund, segments free for only half of their length, and very different leaves.

A. MacLeayi falls under Sect. EUALOE, subsect. *Grandes*, but does not fit well into any of the series included thereunder. It does not appear to be closely allied to any described species, and when the Aloes of Tropical Africa have been more fully worked out, some new sections and series will be necessary.

DESCRIPTION. A large acaulescent plant, apparently solitary and not suckering or forming groups.

Leaves about 24, densely rosulate, erectly spreading and gracefully recurved, lanceolate-attenuate, up to 50 cm. long, 12 cm. broad at base; *upper surface* deep-green to olive-green, obscurely lineate, without spots, rather flat near base, deeply canaliculate upwards; *lower surface* rounded, similar to the upper surface in colour; *margins* yellowish-white, armed with firm, white, uncinnate, deltoid teeth which are 4 mm. long, irregularly 8—15 mm. distant. *Leaf sap* dries yellow.

Inflorescence a much-branched panicle 90 cm. high, produced at a slight angle but with all racemes erect.

Peduncle brown, flattened and 2 cm. broad at base, dichotomously about 9-branched from below the middle.

Racemes cylindric-conical, the terminal 22 cm. long, 5·5 cm. diam., laterals a little shorter, buds minutely white-spotted, suberect, denser, open flowers laxer, subpendulous.

Bracts small, clasping the pedicel, broadly and shortly ovate-acute, 3 mm. long, 4 mm. broad, pale brown, thin, subscarious, 3-nerved, the central nerve raised, dark-brown.

Pedicels dull scarlet, lowest 10 mm. long.

Perianth cylindric-trigonous, 36 mm. long, scarlet at base and along the nerved part of the outer segments to the middle, the mouth orange to yellowish, slightly rounded at base and not stipitate, 7 mm. diam. across the ovary, thence trigonous upwards; *outer segments* free to base, 6 mm. broad at the middle, with pale thin edges, 3—5-nerved throughout, the apices subacute, spreading; *inner segments* free, longer and thinner than the outer, 7 mm. broad at the middle, with a prominent orange keel throughout, the apices brown-tipped, more obtuse and more spreading to revolute.

Filaments very pale lemon, filiform-flattened, the 3 inner narrower and lengthening before the 3 outer, with their *anthers* in turn exserted 2—3 mm.

Style pale yellow. *Stigma* at length exserted 3 mm.

Ovary olive-green, 7 mm. long, 3 mm. diam.

ACKNOWLEDGMENT.

Although I could not reach the Imatong Mountains, I am indebted to the South African Council for Scientific and Industrial Research for a travelling grant which enabled me to investigate other species of Aloe in the southern Sudan in July—August 1954.

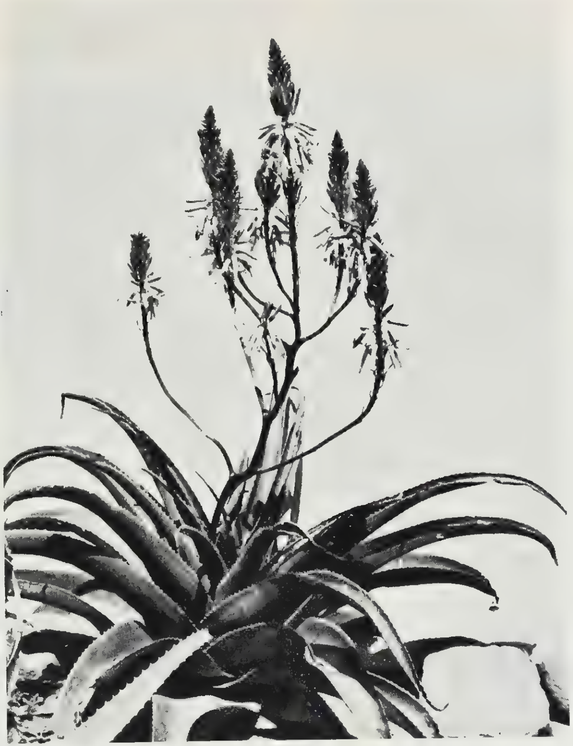

Fig. 1.

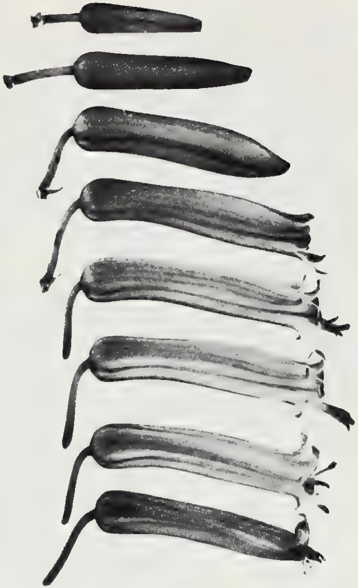

Fig. 2.

Plate III. *A. MacLeayi* Reynolds.

Fig. 1.—Plant × 1/10 from near Gilo, Imatong Mountains, Equatoria Prov. Sudan, cult. Johannesburg, fl. 27 March 1955.

Fig. 2.—Flowers 1/1 from bud to post-pollination stage.

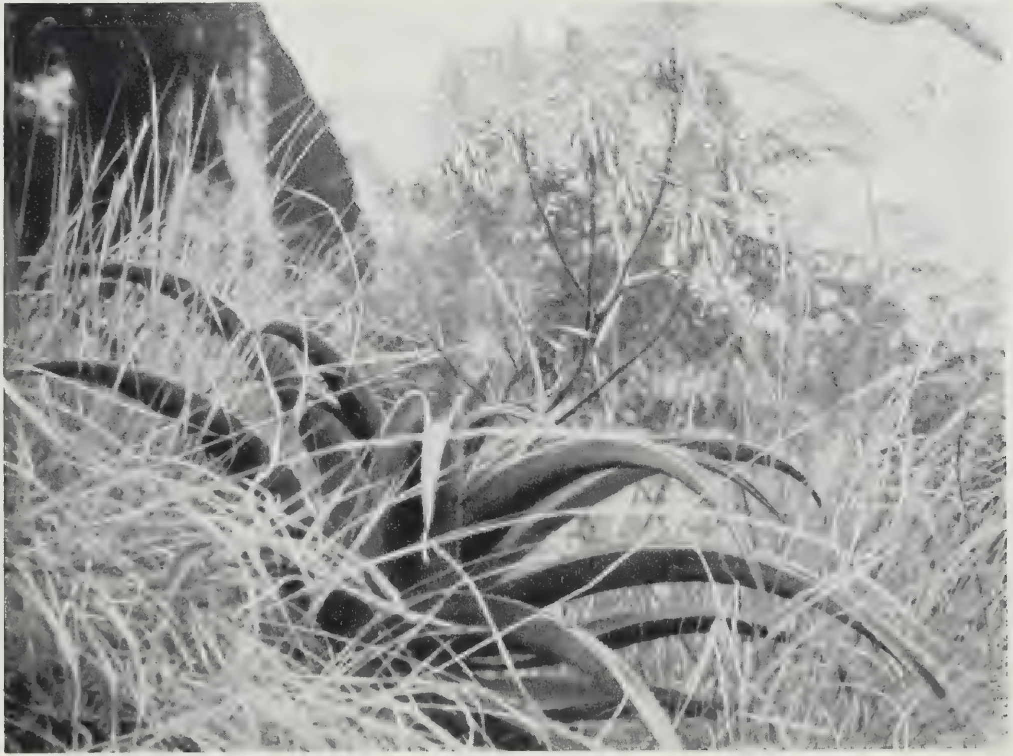

Plate IV. *A. MacLeayi* Reynolds.
Plant on grassy hillside, among rocks, near the Rest House, Gilo, Imatong Mountains, Equatoria Prov., Sudan. Alt. 6,300 ft. Fl. 24 June 1947. (*Photo:* Dr. K. N. G. MacLeay.)

A NEW ALOE FROM ETHIOPIA.

By G. W. Reynolds.

(With Plate V.)

Aloe Jacksonii Reynolds. Species nova, *A. jucunda* Reynolds floribus arcte affinis, sed caule gracile (20 cm.), et foliis longioribus, angustioribus differt.

Planta succulenta, parva, sobolifera, caespitosa. *Caules* usque ad 20 cm. longi, 8—10 mm. diam. *Folia* anguste subulato-attenuata, patula, 10—15 cm. longa, 10—14 mm. lata, supra leviter canaliculata, subtus convexa, utrinque maculata, ad margines dentibus albidis minutis ·5—1 mm. longis, 3—6 mm. distantibus munita. *Inflorescentia* simplex, 25 cm. alta. *Racemus* 5—7 cm. longus, laxe ca. 10—14-floribus. *Bracteae* ovato-acuminatae, albidae, subscariosae, 4 mm. longae, 2·5 mm. latae, 3-nervatae. *Pedicelli* 5—7 mm. longi. *Perigonium* coccineum, cylindricum, 27 mm. longum; segmenta exteriora per 6 mm. libera. *Antherae* 2 mm. exsertae. *Stigma* demum 3 mm. exserta. *Ovarium* 5 mm. longum, 2 mm. diametro. (Plate V.)

Ethiopia: Ogaden Prov., El Carre, ca. 5° 50′ N., 42° 07′ E., coll. T. H. E. Jackson, cult. Johannesburg, fl. 7 June 1953, Reynolds 6224 holotype (PRE); Reynolds 7629 without flowers (PRE, K).

This distinctive new species was first collected in 1943 at El Carre by Mr. T. H. E. Jackson when he was Acting Senior Civil Affairs Officer during the war. El Carre lies west-south-west of Gabredarre, at a point about 120 miles north of Dolo, in the Ogaden Province of Ethiopia.

Mr. Jackson states, "El Carre is a strange rock outcrop with precipitous sides, and the station was built below the precipice. There is a steep path winding up a cleft, and the Aloes were found along the edge at the top."

Plants were sent by Mr. Jackson to Mr. P. R. O. Bally, botanist at the Coryndon Museum, Nairobi, and in 1951 Mr. Bally sent a specimen to me. This plant grew well in Johannesburg where it flowered in June 1953. Subsequently, in August 1954, I studied a large group of plants (not flowering) in Mr. Jackson's garden, on his estate "Kapretwa", west of Kitale, on lower foothills of Mount Elgon, Kenya Colony. Under those conditions, at 6,500 feet, plants flower in February.

A. Jacksonii is one of a group of species very closely allied in racemes, short pedicels, and flowers, but differing considerably in habit of growth and in leaf characters. This group has not yet been worked out, but it includes at least four species. One of these is *A. jucunda* Reynolds from Gaan Libah, Somaliland Protectorate, which is almost identical in simple inflorescence characters, but differs in having broadly ovate-acuminate leaves which are only 4 cm. long and 2·5 cm. broad. (See this *Journal* 19: 21 (1953), Plate XI.)

Another species, hardly separable from *A. Jacksonii* and *A. jucunda* in simple inflorescence characters, was found in numbers by Mr. Bally 8 miles north-west of Borama, 10 miles east of Borama, on the Fodjor escarpment west of Sheik, and in the Waggar Mountains, all in Somaliland Protectorate. It is distinguished by having broadly ovate-attenuate leaves 10—15 cm. long, and is awaiting description.

Another near ally in racemes and flowers only, is *A. Erensii* Christian, from Lokitaung, Turkana, Kenya Colony, but this is a much larger plant with a 6-branched inflorescence up to 55 cm. in height. (See *Fl. Plants S. Afr.* Plate 797 (1940).)

A. Jacksonii is distinguished from its nearest allies by having erect or sprawling slender stems up to 20 cm. long forming dense groups, and especially by its narrowly subulate-attenuate leaves up to 15 cm. long but only 10—14 mm. broad.

DESCRIPTION. A small soboliferous, caespitose, succulent plant forming compact groups up to 30 cm. and more across.

Stem simple or branched at base, erect or sprawling, 10—20 cm. long, 8—10 mm. diam.

Leaves 5—7 at apex of stems, narrowly subulate-attenuate, 10—15 cm. long, 10—14 mm. broad near base, basally sheathing, with short striate internodes, youngest leaves suberect, older leaves spreading and with an obtuse apex bearing 1—2 firm white spines about 1—2 mm. long; *upper surface* slightly concave low down, more canaliculate upwards (more fleshy and plano-convex in cross-section in watered cultivated plants), dull green with several dull very pale-green lenticular markings irregularly scattered mostly in lower half of leaf; *lower surface* rounded, dull greyish-green, with numerous dull pale-greenish lenticulate markings or spots irregularly scattered or sometimes arranged in broken transverse bands; *margins* straight, with isolated, firm, deltoid, white teeth which are reddish-brown tipped and about 1 mm. long low down, 3—6 mm. distant, becoming smaller to obsolescent upwards. *Sap* dries yellow.

Inflorescence simple, 22—25 cm. long.

Peduncle plano-convex and 4 mm. broad at base, terete and 2·5 mm. diam. below the raceme, with about 5 sterile-bracts, the lowest ovate-acuminate, thin, white, 5-nerved, 7 mm. long, 5 mm. broad, gradually smaller upwards.

Raceme cylindric, 5—7 cm. long, laxly 10—14-flowered, youngest buds suberect, open flowers pendulous, the apex a small tuft of wilted bracts.

Bracts ovate-acuminate, 4 mm. long, 2·5 mm. broad at base, thin, subscarious, white, 3-nerved.

Pedicels 5—7 mm. long.

Perianth bright scarlet-red (R.C.S. I) or scarlet (R.H.S. Colour Chart 19/1), paler to almost white at the mouth, 27 mm. long, cylindric-trigonous, basally flat, 8 mm. diam. over the ovary, thence narrowing very slightly to the throat with the mouth wide open; *outer segments* free for 6 mm., with white edges, 3-nerved, the apices subacute, spreading; *inner segments* broader than the outer, and with more obtuse more spreading apices.

Filaments yellow, filiform-flattened, the 3 inner narrower and lengthening before the 3 outer, with their *anthers* in turn exserted 2 mm.

Style filiform, with *stigma* at length exserted 3 mm.

Ovary pale olive, 5 mm. long, 2 mm. diam.

ACKNOWLEDGMENT.

Although it was not possible to reach El Carre, I am indebted to the South African Council for Scientific and Industrial Research for a travelling grant which enabled me to investigate several other species of Aloe in Southern Ethiopia and Somalia in September 1953.

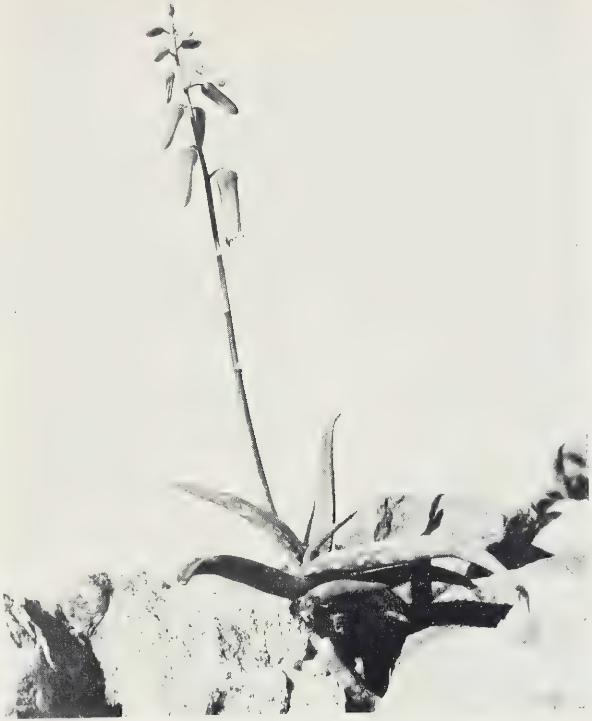

Fig. 1.

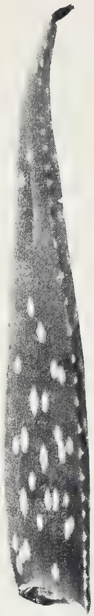

Fig. 2.

Fig 3.

Plate V. *A. Jacksonii* Reynolds.

Fig. 1.—Young plant × 1/3 approx., from El Carre, Ogaden, Ethiopia, cult. Johannesburg, fl. 7 June 1953.

Fig. 2.—Leaf 1/1, showing upper surface and marginal teeth.

Fig. 3.—Flower 1/1 with pedicel and bract.

THE SPHAEROCARPALES OF SOUTH AFRICA.

By Johannes Proskauer.

(*Department of Botany, University of California, Berkeley, Calif., U.S.A.*)

The order Sphaerocarpales comprises a group of liverworts of particular interest to the morphologist. It also seems to pose a problem to the student of distribution: if one surveys the literature it appears that, on numbers of recorded species, the aquatic genus *Riella* has its main centres in North and South Africa, whereas that of the terrestrial *Sphaerocarpos* lies on the Pacific coast of North America. But I believe there is much illusion in this. For different reasons it can be said that one does not normally find members of the group in the field without being familiar with them and it will be a very long time before our knowledge of their distribution will be sufficient to justify serious discussion.

It is fortunate that there exists the outstanding monograph by Miss Wigglesworth (1937) on the South Africa species of *Riella.* Since its publication a further species of the genus has been found there, and *Sphaerocarpos* has been recorded for the first time in the area (Proskauer, 1954). The present paper is intended merely to supplement that by Miss Wigglesworth.*

SPHAEROCARPALES Cavers, New Phyt. ix: 84, 1910.

SPHAEROCARPACEAE DuMortier orth. mut. Migula, Kryptogomen-Flora i: 419, 1904. Sphaerocarpeae DuMortier, Hep. europ., p. 12, 1874.

Sphaerocarpos [Micheli] Boehmer, in Ludwig, Definit. gen. pl., p. 501, 1760.

Sphaerocarpus Boehmer orth. mut. Boehmer, op. cit., index, 1760, lapsus pressus.

non "*Sphaerocarpus* Heister" in Fabricius, Enumerat. method. plant. horti. med. helmstadiensis, p. 28, 1759, nomen invalid. (sub Art. 46, Intern. Code 1952; listed in synonymy. This edition not seen, fide Britten, Journ. of Bot. xxxvi: 398, 1898.)

non "*Symphoricarpus* Adans. Fam. Pl. ii: 14, 1763." Frye et Clark, Hep. N. Am., p. 105, 1937 (cf. Bull. Torrey Bot. Club xxxvii: 219, 1910!), lapsus calami.

Sphaerocarpos stipitatus Bischoff ex Lindenberg. Verh. Leop.-Carol. Akad. Naturf. x (= Nova acta xviii): 504i, 1837.

S. berterii Montagne. Ann. sci. nat., 2. sér, Bot. ix: 39, 1838.

S. berteroi Mont. orth. mut. Stephani. Spec. hep. i: 198, 1899.

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*Descriptions of new taxa in the genus *Riella* from North Africa and the Southern Hemisphere published since can be found in Maire and Weiller (1939), Banwell (1951), Müller (1953). Cf. also Trabut (1942).

Known from:

- (*a*) Quillota, Chile (leg. Bertero).
- (*b*) Banks of pools, Palmiet River, near Grahamstown, Cape Province, South Africa (leg. Britten, Pocock).
- (*c*) Clanwilliam, Cape Province (leg. Schelpe, nr. 4877; Herb. Bolus).

A detailed account of this plant has been published recently (Proskauer, 1954). The plants dichotomise repeatedly and the axes bear middle lobes and two rows of "succubous" appendages. The details of this tend to be obscured by the sex organs. Fig. 1 shows a male plant including the juvenile thallus, Fig. 2 part of a luxuriant male plant from a culture. The female

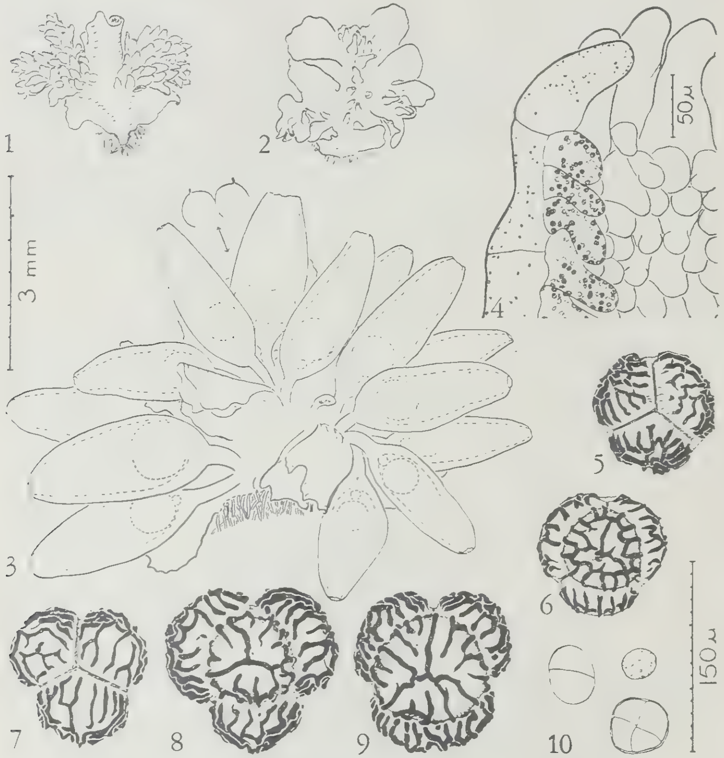

Fig. 1—10. *Sphaerocarpos stipitatus*, from Grahamstown. Fig. 1. Male plant; field material. Fig. 2. Part of male plant; culture. Fig. 3. Part of female plant with sporophytes; field material. Fig. 4. Mouth region of mature bottle split open lengthwise, as seen from the inside. Fig. 5—9. Spore tetrads; Fig. 8 and 9 show the same tetrad in different views. Fig. 10. Sterile cells. (From Proskauer, 1954.)

plants (Fig. 3) are considerably larger and bear a profusion of stalked bottles ("ampullae", "involucres") containing the sporophytes. The bottle wall consists of an outer layer of large, almost colourless cells and an inner highly photosynthetic layer (Fig. 4).

The spores remain permanently united in tetrads (Figs. 5—9). Their colour varies from pale yellow brown to almost black and their size from 95—135 μ in maximum diameter. They are intermixed with "sterile cells" ("nurse cells", Fig. 10).

Very distinct (heterochromatic) sex chromosomes are present. Fig. 11 shows a metaphase squash preparation of a male set, Fig. 12 that of a female set.

RIELLACEAE (Husnot) Migula, Kryptogamen-Flora i: 419, 1904. Rielleae Husnot, Hepatol. gallica, p. 86, 1881, as "Riellées". Rielloideae Schiffner, in Engler et Prantl, Nat. Pflanzenfam. i: 3: 49, 1893.

Riella Montagne, Ann. sci. nat., 3. sér., Bot. xviii: 11, 1852.

non "*Riella* Rafin." Léveillé, in d'Orbigny, Dict. univ. d'hist. nat. viii: 488, 1849, nomen nudum. Prob. lapsus pressus = *Rimella* Rafinesque-Schmaltz.

Duriaea Bory et Montagne, Compt. rend. Ac. Sci. xvi: 1115, 1843, non *Durieua* Mérat, Mem. Soc. Roy. Sci. Lille 1827–28: 432, 1829 (not seen. Generally accepted as homonymous.)

Durieua Mont. orth. mut. Hofmeister, Ber. K. Sächs. Ges. Wiss., Math.-Phys. Kl. vi: 92, 1854, non *Durieua* Mérat. Lapsus, pro syn.

Duriella Bory ex Billot, in exsicc. "Herbarium fontanesianum normale", nr. 100, 1861. Lapsus.

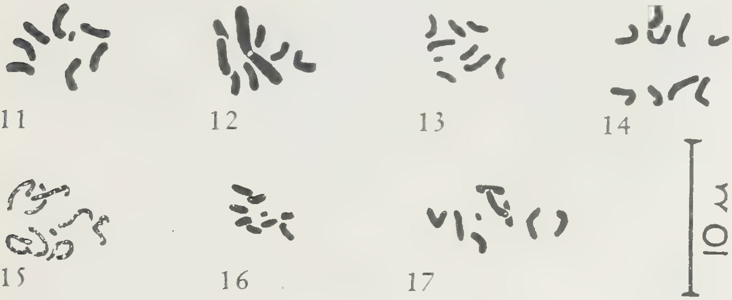

FIG. 11—17. Chromosome sets from material in culture. *Sphaerocarpos stipitatus:* FIG. 11. Male. FIG. 12. Female. *Riella purpureospora:* FIG. 13. Male. FIG. 14. Female. *R. affinis:* FIG. 15, 16. Pro- and metaphases; Grahamstown material. FIG. 17. Canarias material. All except FIG. 12 and 14 from antheridial squashes.

Duriena Mont. orth. mut. Currey in Hofmeister, On the . . . . higher cryptogamia, p. 98, 1862, lapsus, pro syn.

Maissonneuvea Trevisan, Mem. R. Ist. Lombardo, Cl. sci. math. nat., Ser. 3. iv: 442. 1877.

All names in honour of M. C. DuRieu de Maissonneuve!

KEY TO SOUTH AFRICAN SPECIES.

1.	Bottles without wings (subgenus *Riella*)	2
	Bottles with (usually 8) wings (subgenus *Trabutiella*)	*R. affinis*
2.	Spores brown	3
	Spores purple or crimson	*R. purpureospora*
3.	Spores without wings	4
	Spores with discoid wing along junction of inner and outer faces	*R. alatospora*
4.	Spines broadly conical, mostly pointed	*R. capensis*
	Spines narrow, mostly truncate	*R. echinospora*

N.B. Incompletely known: *Riella* sp. (Valkenberg vlei).

Subgenus **Riella.**

Euriella Porsild, Bot. Tidskr. xxiv: 327, 1902.

(Sectio) *Laevigatae* Allorge, Pflanzenareale iii: 45, 1932.

Riella purpureospora Wigglesworth, Journ. Linn. Soc., Bot. li: 312. 1937. Known from vleis on the Cape Flats, near Cape Town.

A detailed description can be found in Wigglesworth (1937) from which paper Figs. 18—20 are taken.

I have had this plant in continuous culture for several years. It was obtained from various soil samples from the Cape Flats, gathered by Dr. M. A. Pocock in 1948. It is easily identified by the striking colouration of its spores. A profusion of purple material stains both spores and capsule jacket during maturation. In other species a purplish pigmentation may sometimes be seen in the setae.

Miss Wigglesworth's statement (op. cit., p. 317): "spores . . . about 112 μ in greatest width" requires emendation. A check of a few capsules yielded spores 90—130 μ (mostly ca. 110 μ) in maximum diameter, incl. spines. Her measurements on other species probably should also be interpreted liberally. Most spores have rather more spines scattered irregularly on their inner faces than is shown in Fig. 20.

Figs. 13, 14 show metaphase squashes of chromosome sets from male and female plants respectively. I interpret the minute chromosome in Fig. 13 and the slightly fat chromosome in Fig. 14 as the y and x chromosomes respectively. Their relative dimensions then agree with those found in *Riella helicophylla* (Lorbeer, 1934) and *Sphaerocarpos cristatus* (Allen, 1936).

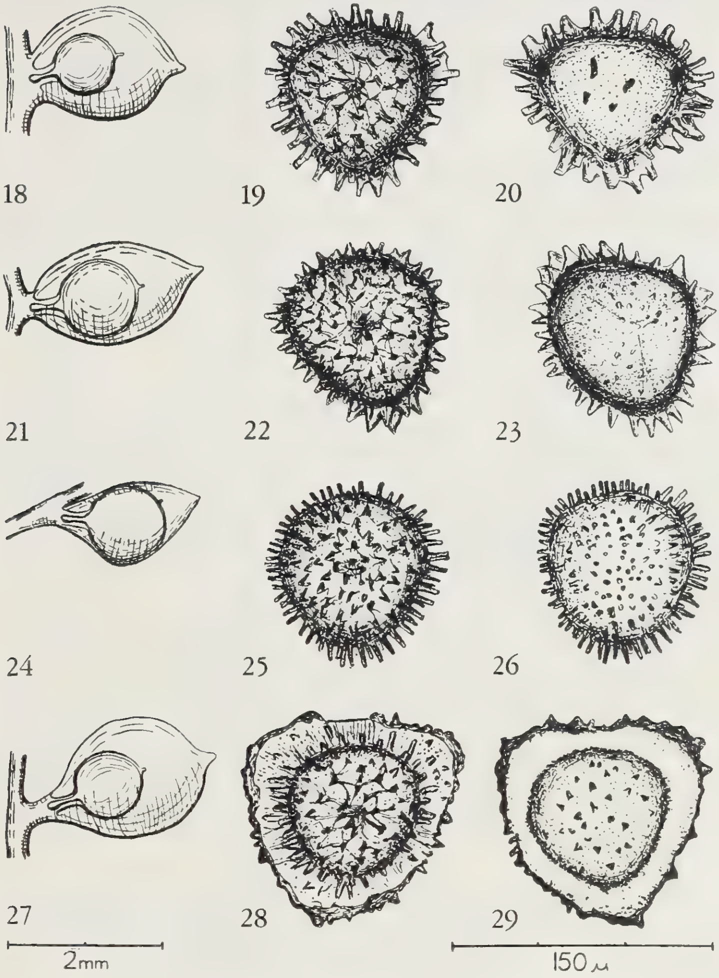

FIG. 18—29. Bottles, and outer and inner faces of spores. FIG. 18—20. *Riella purpureospora*. FIG. 21—23. *R. capensis*. FIG. 24—26. *R. echinospora*. FIG. 27—29. *R. alatospora*. (From Wigglesworth, 1937.)

Riella capensis Cavers, Rev. bryol. xxx: 81, 1903.

Known from Port Elizabeth, Cape Province. (Exclude records from Cape Flats in Sim, 1926, which probably belong to the species described from there by Miss Wigglesworth.)

Fig. 21—23 (from Wigglesworth, 1937), illustrate the shape of bottle and spores.

Riella echinospora Wigglesworth, Journ. Linn. Soc., Bot. li: 321, 1937.

Known from near Brandfort, Orange Free State (Stephens and Wigglesworth). A sporeling with attached spore probably belonging to this species was isolated during class work at Berkeley from a culture, prepared from soil gathered by Dr. Pocock on the Cape Flats.

Figs. 24—26 (from Wigglesworth, 1937) illustrate the shape of bottle and spores.

Under this entry I include a plant gathered by Dr. Pocock at the Palmiet River, Table Rock Farm, Cradock Road, 7 miles from Grahamstown, C.P., on Dec. 12, 1952. It differs from *R. echinospora* as described by Wigglesworth in having a more definite reticulation on the outer face of the spore. The marginal spines of the spores sometimes show a light webbing, but less so than frequently found in *R. purpureospora*. In a fragment of a very old thallus two bottles have stalks ca. 2—3 mm. long, but generally the bottles are sessile.

Riella alatospora Wigglesworth, Journ. Linn. Soc. Bot. li: 317, 1937.

Known from vleis on the Cape Flats, near Cape Town.

Figs. 27—29 (from Wigglesworth, 1937) illustrate the shape of bottle and spores. The bottles frequently are borne on a short stalk. The spore size, given by Wigglesworth as "circa 120μ" varied from 80—140μ in a few capsules checked (from preserved material in Department of Botany, Queen Mary College, London).

Riella sp.

Miss Wigglesworth (1937, p. 324) described briefly a *Riella* with bottles on short stalks from preserved material (still extant in Herb. Mus. Manchester) collected at Valkenberg vlei by Miss Stephens. The thalli are highly convolute. Miss Wigglesworth told me that she has not obtained any further information about this plant.

Subgenus **Trabutiella** Porsild, Bot. Tidskr. xxiv: 327, 1902.

(Sectio) *Plicatae* Allorge, Pflanzenareale iii: 45. 1932.

Riella affinis Howe et Underwood, Bull. Torrey Bot. Club xxx: 221, 1903.
R. vishwanatai Pandé, Misra et Srivastava, Rev. bryol., N.S. xxiii: 166, 1954.

The organism is known so far from four widely scattered localities:

(*a*) Tafira, Gran Canaria (Howe and Underwood, 1903).
(*b*) Stanford, California (Thompson, 1940).
(*c*) Near Banaras, Uttar Pradesh, India (Pandé et al., 1954).
(*d*) Near Grahamstown, Cape Province, South Africa (leg. Pocock, see below).

No doubt it will be found in due course in many others.

R. affinis is by far the best known species of the genus. Besides the descriptions given by Howe and Underwood (1903) and Pandé et al.

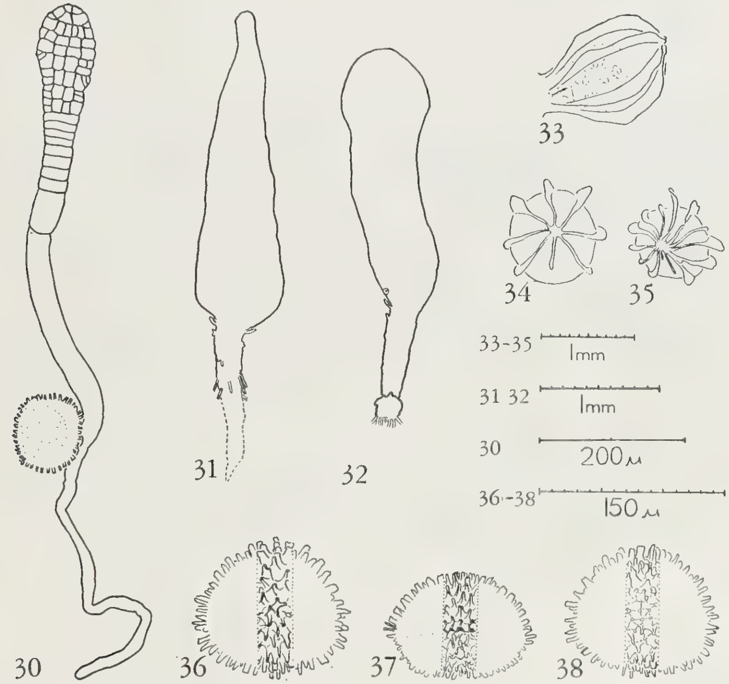

Fig. 30—38. *Riella affinis*, from Grahamstown. Fig. 30, 31. Sporelings. Fig. 32. Gemmaling. Fig. 33. Bottle in side view. Fig. 34. Normal bottle in end view, the sector with the incomplete wing was facing the thallus. Fig. 35. Bottle with additional wings. Fig. 36—38. Outer face, side view, inner face of the same spore. Fig. 35—38 from field material, the rest from cultures.

(1954), there are the outstanding contributions to the study of its morphology made by Thompson (1941-2) and the detailed physiological investigations by Straub (1948). In a personal communication Prof. Straub informed me that his cultures, received from Prof. Wettstein, were derived from a collection made by Prof. Cupper on a trip to the Canaries. Further work on these cultures is in progress, and a report on it was given by Dr. Luise Strange to the Bryological Section at the International Botanical Congress, Paris, 1954. To the taxonomer this work is a much needed warning to heed the wide limits of individual variation in *Riella.*

The plant was discovered in South Africa by Dr. M. A. Pocock, growing in great profusion at "Farmdam, 4 miles from Grahamstown, on Cradock Rd. . . . about $\frac{1}{4}$ mile down from road". Preserved and dried material, as well as a soil sample, collected on 31 March, 1953, were kindly communicated by her. The plant is being grown in culture at Berkeley.

The specimens were checked against Herb. U. Calif. 298117 "Kryptogamae exsiccatae editae a Mus. Hist. Nat. Vindobon. 2971. *Riella affinis* Underwood et Howe. Insulae canarienses (Gran Canaria): Tafira, M. Jun. fr. leg. Alice Carter Cook, comm. Smithsonian Institution", presumed isotype. My findings contribute little beyond the description by Thompson (1941—42) and I shall give a brief account only. (I have never observed explosive discharge of antheridia in *Riella.* Although the formation of two apical cells in germlings, as described by Thompson, is no doubt the norm, I have found frequent variation from it. The segmentation sequence in a young germling is also rather more variable.)

The spores are brown in colour. Figs. 36—38 show three aspects of the same spore. Their size varies from 70—130μ in maximum diameter; those from an individual sporangium tend to be fairly uniform (for general considerations cf. Proskauer, 1954, p. 152—3). Clearly spore size is of limited diagnostic value in the order, and its consideration forms a basic weakness of Wigglesworth's (1937) key.

Germination, as in other species, always occurs by development of a germ tube from the outer spore face, probably implying an ancestry of forms with permanently united tetrads, a situation paralleled in certain species of *Riccia* (cf. Duthie and Garside, 1936). Fig. 30 shows a sporeling at the end of the phase of apical growth. The pair of apical cells can be seen at the tip. Sporelings are highly plastic, main factors being depth of germinating spore under surface of substratum and degree of competition. Through its peculiar intercalary growth mechanism the enlarging sporeling potentially yields two adult shoots (Figs. 31, 40), although frequently but one of these is realized (Fig. 39, 42) or if both are realized one frequently aborts (Fig. 41).

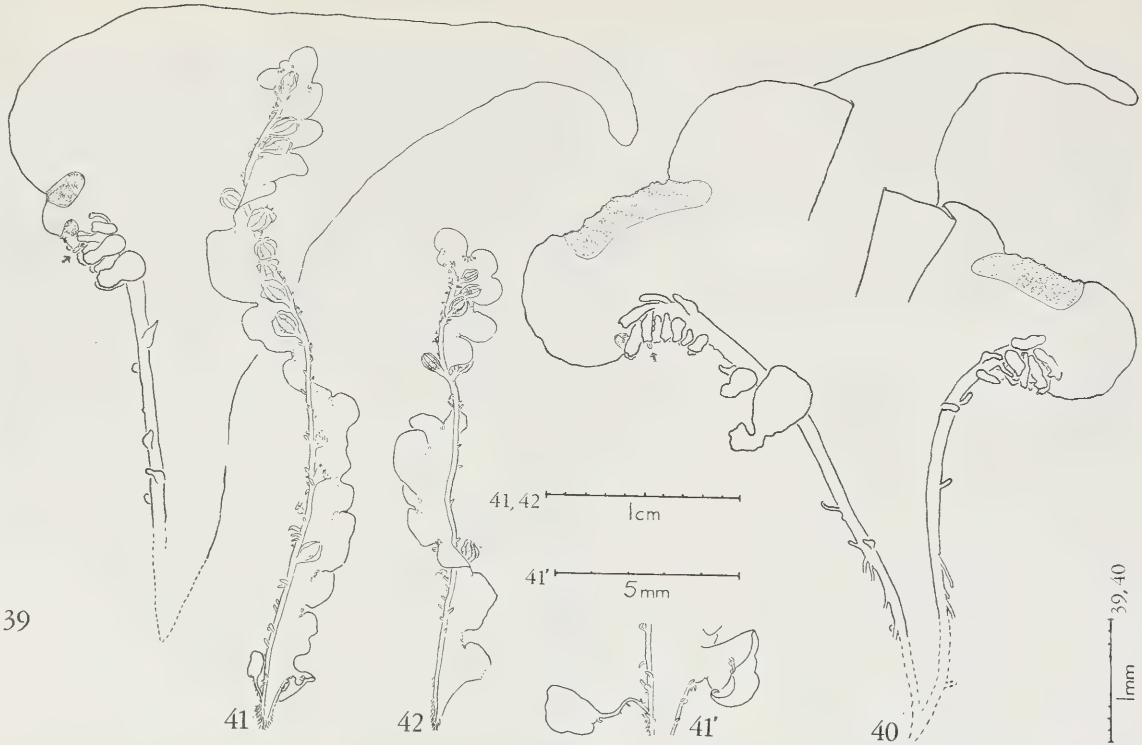

Fig. 39—42. *Riella affinis*, from Grahamstown material in culture. Fig. 39—40. Sporelings, bearing gemmae and the first antheridia and archegonia. (See arrows.) Fig. 41—42. Mature plants. Fig. 41^1. The basal part of the plant in Fig. 41, to show the adventitious branch and abortive second shoot.

In one culture only, the young sporelings produced gemmae, but there they were developed in profusion (Figs. 39—40). They germinated readily, giving rise to gemmalings differing from sporelings only in two respects: instead of having a tapering base they have a rounded folded over lobe at the bottom, and instead of narrowing towards the apex their upper ends are broad (cf. Figs. 31 and 32). An excellent account of the structure and development of the similar organs of *Riella americana* has been provided by Studhalter and Cox (1940—42). Gemmalings also abounded in the South African field collection.

Under the prevailing culture conditions the specimens reach a length of ca. 3 cm. (Fig. 41), this length being governed by the depth of the liquid, and in width were comparable to the somewhat shorter, fairly young, field material. In poor and crowded cultures the plants are narrow and stunted. A torsion shown in Fig. 41 is normal. Occasionally the spiral runs in the opposite direction. It may show reversal, usually involving a region of axial tissue devoid of wing (Fig. 42, cf. Douin and Trabut, 1931). Fig. 41 illustrates an adventitious branch. Fasciculate adventitious branching was observed in specimens in old, neglected cultures.

R. affinis is the only monoecious species of the genus so far recorded in South Africa. The antheridial crest is discontinuous, with a variable number of antheridia per segment. These parts of the antheridial crest, shortly above the growing point, become sharply offset against the ground tissue of the wing. The sterile cells protecting the antheridia soon mature; the unistratose wedges of ground tissue remain actively meristematic for a considerable period. They not only play their part in the "unrolling" of the wing, but ultimately yield the prominent lappets (cf. Fig. 42) between the segments of the crest. The bottles protecting the fertilized archegonia are sessile or briefly stalked (Fig. 33). Normally they have 8 wings; in bottles growing closely against the thallus the development of these wings may be curtailed on the contact surface (Fig. 34). Occasional bottles with additional wings are found; Fig. 35 shows an extreme case taken from a thallus carrying both normal and further variant bottles. The orifice occludes during development. The bottles frequently are gas-filled, conceivably a useful feature in photosynthesis and respiration of the sporophytes. (Müller, 1953, mentioned that in *R. cossoniana* var. *echinata* the mature bottles break off from the plant after their stalks die, and float by means of such an air bubble. I have not observed this in any *Riella* I have cultured.) The sporophyte conforms to the structure normal in *Riella* and *Sphaerocarpos*, and shows the remarkable early setal necrosis, leaving foot and capsule as separate photosynthetic units (cf. Studhalter, 1942; Proskauer, 1954). The calyptra is mostly ruptured and pushed aside; the capsule is then held only by the dead seta. Spore discharge is by breakdown of bottle and jacket. At this stage the "sterile cells" ("nurse cells") have disappeared.

The plants have a chromosome set of 8 larger chromosomes and one heterochromatic small chromosome (Figs. 15, 16).

Prof. Straub kindly sent me some spores of the material from the Canary Islands mentioned above. Plants raised from these spores are essentially similar to those of the South African material. They also form gemmae. When grown on "hard" (2%) mineral agar with supernatant water the gemmae float down from the plants and settle flat on the agar surface. Sometimes the gemmae first rise to the surface of the water before sinking. After 1—2 days growth curvature in the region of juncture of "rhizoidal lobe" and "column" (terminology of Studhalter and Cox, 1941) where most of the earliest rhizoids are here situated, results in the formation of the characteristic V-shaped base (cf. Fig. 32) and turns both the free part of the rhizoidal lobe and the bulk of the gemmaling into the vertical. The chromosome set of this material (Fig. 17) is also identical with that of the South African plants.*

COMMENTS.

A survey of the literature on the genus *Riella* suggests that a revision based on culture work would be highly desirable. At this time it may still be possible to obtain living material of most of the described taxa from their type areas; a very helpful factor is the remarkable longevity of the spores. I might mention here a satisfactory culture method I chanced on recently. 500 ml. of a "hard" agar medium (agar 20 g.; NH_4NO_3 0·2 g.; $CaCl_2$, KH_2PO_4, $MgSO_4.7H_2O$ 0·1 g. each; $FeCl_3.6H_2O$ 5 mg.; distilled water to 1 l.) are poured into a 1-litre conical flask and later covered with 300 ml. distilled water. Spores or fragments of living plants can be used as the inoculum.

It has already been pointed out above that the chromosome complements of the dioecious *Riella purpureospora* and *R. helicophylla* resemble that of *Sphaerocarpos cristatus*. But in the *Riellae* the total number of the chromosomes is 9, as opposed to the 8 of *Sphaerocarpos*. (Kruch, 1890, in his classic paper recorded 8 as the chromosome number of *Riella parisii*, but it is probable that he overlooked an additional small chromosome.) So far genetic analysis has been restricted to *Sphaerocarpos*, than which few plants are better understood in this respect (for summary see Lorbeer,

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*In a recent letter Dr. Strange also confirms the morphological identity between the Grahamstown and Canary Islands strains, but tells me that she finds certain physiological differences between the two in her cultures.

1941; Allen, 1945). I was greatly surprised at the chromosome set of the monoecious *Riella affinis*, for it resembles not as one would expect that of the female plants of the studied dioecious species, but that of their male plants (compare Fig. 17 with Fig. 13). Now we require information on the other *Trabutiellae*, both of which are dioecious. The North African *R. cossoniana* Trabut differs from *R. affinis* essentially only in the sex-distribution, (?)somewhat shorter spines on the spores (not so in the recently described var. *echinata* Müller, 1954) and (?)more continuous antheridial crest; in *R. paulsenii* Porsild (1902), from Bukhara, the spines are of different shape, but the antheridial crest is exactly as in *R. affinis*.

The figures in this paper taken from Wigglesworth (1937) and Proskauer (1954) have been reproduced by kind permission of the Linnean Society. My thanks are due to Mr. Garside, Dr. M. A. Pocock, and Prof. J. Straub for sending me material.

SUMMARY.

The paper forms a revision of the members of the genera *Sphaerocarpos* and *Riella* found so far in South Africa. An account of some culture work on *Riella affinis* Howe et Underwood, recently recorded from the area, is given. *R. vishwanathai* Pandé et al. is reduced to a synonym of this species. Certain cytological and taxonomic problems are briefly discussed.

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ON THE PHENOLOGY OF THE VELD AROUND JOHANNESBURG.

I. *MONOCOTYLEDONS.*

By H. B. Gilliland.

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Apart from some dated field observations on the veld north of Johannesburg about half a century ago (Rand, 1903), which give an indication of the flowering seasons, Glover's paper (Glover, 1937) remains the only attempt to correlate the behaviour of Witwatersrand plants with the seasons. Glover was principally concerned with the grassland habitat as developed on the Older Granites to the north of the City proper at Frankenwald. It is not out of place therefore to endeavour to extend his observations to deal more comprehensively with the whole flora of the City area. This paper attempts an analysis of the Monocotyledons in which at least one species of the majority of the recorded genera is dealt with.

CLIMATE.

Table 1 gives a summary of the City's climate. A summer of 4 months, a spring and autumn of 3 months each and a winter of 2 months is experienced. Frost has at one time or another been recorded over the 8 months period of March to October although it is only of unexceptional occurrence in winter. Apart from frost the period of greatest difficulty for plants is spring when, before the rains break, a period of rising temperatures with low vapour pressure is experienced. Relative humidities of as low as 18% with an ambient temperature of 25°C. have been recorded at this time. The topography is such that even in the most severe frosts of winter some natural north facing sites and many similar garden corners remain frost free, while streamsides and vleis (marshes) provide habitats where the severity of the spring drought is mitigated.

FLOWERING GROUPS.

Within this climatic framework the following groups of Monocotyledons may be distinguished. The symbols used are:—*a.* annual; *w.* water plant; *g.* grass, usually hemi-cryptophyte; *z.* geophyte; *x.* hysteranthous.

FLOWERING IN WINTER.

Aloe davyana (June—Aug.)

,, mutabilis (July—Sept.)

Hordeum murinum (May—Oct.) a.g.

TABLE I. TABULAR SUMMARY OF JOHANNESBURG'S CLIMATE.

MONTH	Nov., Dec., Jan., Feb.	March, April, May.	June, July	Aug., Sept., Oct.
SEASON	Summer	Autumn	Winter	Spring
RAIN (as a percentage of annual total)	Each month 15%	Rain decreases to 4% in May.	Each month <1%	Rain uncertain—up to 7½% in Oct.
FROST	None	May occur in late April.	Frequent	Occasional
TEMPERATURE (mean monthly max.)	25°C.	Falling to <20°C.	<17°C.	Rising to <25°C. in Oct.
TEMPERATURE (mean monthly min.)	14°C.	Falling to <6°C.	<4°C.	Rising to <9°C. in Oct.
SUNSHINE (percentage of possible daily)	70%	75%	80%	75%
ACTUAL VAPOUR PRESSURE (at warmest time of day)	15 mbs.	11 mbs.	7 mbs.	9 mbs.

The *Hordeum* is adventive and has persisted on one or two sites as a winter weed. The *Aloes* are truly frost resistant.

SPRING. I. THE PRE-RAINS FLORA. Aug.-Sept.

Stiburus conrathii *g.*
Rendlia nelsoni *g.*
Juncus subglobosus *a. w.*
Bulbine stenophylla *z.*
Urginea multisetosa *x. z.*
Scilla ovatifolia *x. z.*
,, marginata *z.*
Litanthus pusillus *x. z.*
Chortolirion subspicatum *x. z.*
Hesperantha longicollis *x. z.*
Eulophia hians *x. z.*
Bonatea sp. *x .z.*
Moraea mossii *x. z.*
Homeria pura *z. w.*

Juncus subglobosus is an annual which apparently is not tolerant of the later summer heat. The two grasses *Stiburus* and *Rendlia* have only recently been recognised as important constituents of the local veld flora due to their early flowering period. The remainder are all geophytes and half of them more or less hysteranthous.

SPRING. II. THE SPRING FLORA PROPER. Sept.—Nov.

Briza minor *g.*
Festuca caprina *g.*
Koeleria capensis *g.*
Brachiaria filifolia *g.*
Eleocharis palustris *w. z.*
Bulbostylis collina *z.*
,, schoenoides *z.*
Schoenoxiphium caricoides *z.*
Carex glomerabilis *z.*
,, drakensbergensis *z.*
Bulbine narcissifolia *z.*
Androcymbium striatum *z.*
Ornithogalum leptophyllum *x. z.*
Albuca pachychlamys (*x.*) *z.*
Urginea depressa *x. z.*
,, rubella *x. z.*
Drimiopsis minor *z.*
Scilla neglecta *z.*
,, saturata *z.*
,, minima *x. z.*
Dipcadi oligotrichum *z.*
Anoiganthus breviflorus *z.*
Haemanthus magnificus *z.*
Böophone disticha *z. x.*
Vellozia retinervis.
Gynandriris mossii *x. z.*(i)
Lissochilus platypetalus *x. z.*
Holothrix sp. *x. z.*

Again hysteranthy is a feature of some species. In *Albuca pachychlamys* there are many forms some hysteranthous, others not.

SUMMER FLOWERING. Nov.—Feb.

Alisma plantago *w.*
Aponogeton spathaceum *w. g.*
Fimbristylis monostachya *z.*
Ascolepis capensis *z.*

(i) Helixyra mossii N.E.Br.

Helictotrichum turgidulum *g.*
Harpechloa falx *g.*
Brachiaria serrata *g.*
Imperata cylindrica *g.*
Heteropogon contortus *g.*
Eleonurus argenteus *g.*
Eragrostis gummiflua *g.*
,, curvula *g.*
Eragroscis racemosa *g.*
,, brizoides *g.*
Triraphis andropogonoides *g.*
Leersia hexandra *w. g.*
Arundinella ecklonii *g.*
Tristachya hispida *g.*
,, rehmannii *g.*
Loudetia simplex *g.*
Sporobolus pyramidalis *g.*
,, stapfianus *g.*
,, centrifugus *g.*
Aristida junciformis *g.*
Tragus berteronianus *g.*
,, koelerioides *g.*
Microchloa caffra *g.*
Lophacme digitata *g.*
Eustachys paspaloides *g.*
Brachiaria nigropedata *g.*
Digitaria tricholaenoides *g.*
Pennisetum thunbergii *g.*
Andropogon appendiculatus *g.*
,, huillensis *g.*
,, eucomus *g.*
Miscanthidium junceum *g.*
Urelytrum squarrosum *g.*
Haemarthria altissima *g.*
Scirpus burkei *z.*
Fuirena pubescens *z.*
Pycreus lanceus *z.*
Coleochloa rehmannii *z.*
Ficinia tristachya *z.*
Kyllinga alba *z.*
Cyperus obtusiflorus *z.*
,, denudatus *z.*
Mariscus marlothii *z.*
Pycreus macranthus *z.*
Scleria buchanani *z.*
Zantedeschia macrocarpa *z.*
Xyris gerrardii *z.*
Cyanotis speciosa *z.*
Anthericum nataglencoense *z.*
Bulbine trichophylla *z.*
Eriospermum hygrophilum *z.*
,, burchellii *z.*
Asparagus cooperi.
Ornithogalum pretoriense *z.*
Tulbaghia alliacea *z.*
Albuca shawii *z.*
Aloe verecunda *z.*
Schizobasis intricata *z.*
Eucomis undulata *z.*
Kniphofia ensifolia *z.*
Dipcadi palustre *z.*
Drimia ciliaris *z.*
Sansevieria zeylanica *z.*
Agapanthus weilligii *z.*
Crinum bulbispermum *z.*
,, graminicolum *z.*
Haemanthus montanus *z.*
Hypoxis filiformis *z.*
Dioscorea sylvatica *z.*
Gladiolus woodii *z.*
,, cooperi *z.*
,, crassifolius *z.*
Tritonia petrophila *z.*
Aristea woodii *z.*
Lapeyrousia laxa *z.*
Eulophia zeyheri *z.*
,, bakeri *z.*
Satyrium ocellatum *z.*

Quite a number of these have a relatively short flowering period either in the early or later part of the season while the grasses on the whole tend to flower over at least two months.

LATE SUMMER—AUTUMN. Jan.—May.

Typha australis *w.*
Potamogeton octandrus *a.*
Zanichellia pedicillata *w.*
Lagarosiphon muscoides *a.*
Eragrostis namaquensis *a.*
,, plana *g.*
Diplachne biflora *g.*
,, fusca *g.*
Pogonarthria squarrosa *g.*
Trichoneura grandiglumis *g.*
Phragmites communis *w. g.*
Agrostis eriantha *a.*
Aristida congesta *a.*
,, barbicollis *a.*
Perotis indica *a.*
Eleusine indica *a.*
Chloris virgata *a.*
Lepturella capensis *g.*
Panicum laevifolium *a.*
,, repens *g.*
Paspalum distichum *g.*
,, scrobiculatum *g.*
Echinochloa colona *a.*
,, stagnina *a.*
Urochloa helopus *a.*
Digitaria monodactyla *g.*
Schizachyrium semiberbe *g.*
Cymbopogon excavatus *g.*
,, marginatus *g.*
Hyparrhenia aucta *g.*
Monocymbium ceresiiforme *g.*
Trachypogon plumosus *g.*
Ischaemum purpureum *g.*
Eleocharis atropurpurea *a.*
Lipocarpha pulcherrima *a.*
Fimbristylis complanata *z.*
Cyperus difformis *a.*
Bulbostylis burchellii *z.*
Pycreus pumilus *a.*
Scleria woodii *z.*
Eriocaulon abyssinicum *a.*
Commelina subulata *a.*
Androcymbium subulatum *z.*
Asparagus asparagoides *z.*
Nerine rehmannii *z.*
Schizostylis pauciflora *z.*
Babiana hypogea *z.*
Disperis micrantha *z.*
Habenaria foliosa *z.*
,, tetrapetala *z.*
Bonatea boltoni *z.*

This group gives strong support to General Smuts' contention (Bews, 1925) that with the advancing season the veld takes on a more tropical aspect. The number of annuals is interesting, a few behave as annuals in this climate being killed by the winter frosts. Many of them are much more prominent in seasons when the rains persist into March and April and are to be found in the shallow detritus edging ponds on rock outcrops.

FLOWERING THROUGHOUT THE FROST-FREE MONTHS Aug.—May.

Potamogeton pectinatus *w.*
Rhynchelytrum repens *g.*
,, setifolium *g.*
Themeda triandra *g.*
Scirpus fluitans *w.*
Alloteropsis semialata *g.*
Eleocharis limosa *w.*
Anthericum micranthum *z.*

The Anthericum is found flowering continuously. The others appear to flower sporadically but may be found in flower in any month apart from June and July.

FLOWERING THROUGHOUT THE YEAR.

Bromus carharticus *g.*
Poa annua *a.*
Ehrharta erecta *g.*
Hyparrhenia hirta *g.*
Setaria verticillata *a.*
Scirpus corymbosus *w.*
Agrostis lachnantha *g.*

The Brome and the *Poa* are adventive and commonly associated with human habitation, likewise the *Scirpus* is a plant of the many artificial ponds and lakes. *Agrostis* is a riverine plant and with the *Ehrharta* the *Hyparrhenia* and the *Setaria* manage to survive the winter in protected spots like the Witpoortjie gorge. *Hyparrhenia hirta* is especially of interest for, through the investigations of the genus necessary to his cytological studies, Krupko (1954) has found that the principal flowering period is January to April and that viable seed may be found from February to the time of the first hard frost usually in May. At other times of the year ripe seed is not found.

The list of plants recorded here is not sufficiently complete to attempt a "biological spectrum" but the large number of hemi-cryptophytes and geophytes amongst the Monocotyledons which grow locally are noteworthy. A fuller discussion of life-forms will be presented after the second part dealing with Dicotyledons.*

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* I have to thank the African Climatology Unit, C.S.A. for guidance in drawing up Table I.

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THE SOUTH AFRICAN SPECIES OF AIZOACEAE.

I. *ADENOGRAMMA* & *POLPODA*.

By R. S. Adamson.

The two genera *Adenogramma* and *Polpoda* are endemic to the S.W. Cape. Together with *Psammotropha* they constitute a group characterised by the possession of carpels with a single basal ovule.

The three genera in this group have been associated by the majority of authors with the tribe *Mollugineae* in whatever family that has been placed. (e.g. Lindley Veg. King. ed. 2. 498. 1847: Endlicher Gen. Pl. 884. 1840: Sonder F. Cap. 1. 152. 1859: Bentham & Hook. Gen. Pl. 1. 855. 1869: Hutchinson Fam. Fl. Pl. 128. 1920.) On the other hand, certain authors (e.g. Heimerl Engl. & Prantl. Nat. Pflanzf. 1. b. 8. 1889: Della Torre & Harms Gen. Siphon. 1. 152. 1900: v. Post & Kuntze Lex. Gen. Phan. 639. 1904: Wettstein Handb. Syst. Bot. ed. 2. 536. 1911: Phillips Gen. S. Afr. Pl. 230. 1926), have laid stress on the solitary ovules and transferred these genera to the family *Phytolaccaceae*. An intermediate position is taken up by Pax & Hoffmann (Engl. & Prantl. Nat. Pflanzf. ed. 2. 16. c. 194. 1934), who retain the genera in Aizoaceae but make them the representatives of a tribe quite separate from *Mollugineae*.

The very close similarity in both vegetative and floral characters between *Adenogramma* and *Psammotropha* on the one hand and *Mollugo* and *Pharnaceum* on the other, renders the placing of them in separate families appear quite unnatural. It would seem that the uniovulate carpel represents a reduction from the multiovulate, *Psammotropha* standing in an intermediate position between *Pharnaceum* and the extreme condition in *Adenogramma*. *Polpoda*, while very close to the others in floral structure, is very distinct and unique in its vegetative habit.

In the course of this investigation in addition to fresh material, specimens in the following herbaria have been examined:—

Bolus Herb., Cape Town	BOL
University of Cape Town	CT
S. Afr. Museum, Cape Town	SAM
Nat. Bot. Gds., Kirstenbosch	NBG
Nat. Herb., Pretoria	PRE
Albany Mus., Grahamstown	GRA
Royal Bot. Gds., Kew	K
British Mus. (Nat. Hist.) London	BM

To the Directors and Curators of these institutions thanks are returned for the facilities afforded for the examination of specimens.

ADENOGRAMMA

Reichb. f. Icon. Bot. Exot. 2. 3. t109. 1828. *Steudelia* Presl Symb. Bot. 1. 3. t. 2. 1829.

Annual or perennial herbs, sometimes woody at the base, usually prostrate or sprawling. *Leaves* small, simple, mostly linear, in whorls at least in the upper parts: stipules small, membranous or thread-like, often caducous. *Flowers* small, white, in axillary cymose groups. *Perianth* segments 5, free or slightly connate at the base, white with a green central portion, usually obtuse and more or less cucullate. *Stamens* 5, alternate with the perianth segments, shorter than the perianth. *Ovary* superior, 1-chambered, with 1 basal ovule: *style* often asymmetrical: *stigma* capitate. *Fruit* indehiscent, a 1-seeded nut, usually laterally compressed.

The type species is *A. Mollugo* Reichb. f.

A rather uniform genus confined to the coastal plain and lowest mountain slopes from Namaqualand to the Cape and eastwards to Swellendam. Only two species are recorded further east.

The species were revised by Fenzl in 1840 and his arrangement was adopted by Sonder in Fl. Cap. Since then little attention has been given to the genus. Ten species are now recognised of which three are described for the first time.

Fenzl's specimens in Herb. Vienna were destroyed during the war 1939—45 and in some cases lectotypes have had to be selected.

KEY TO THE SPECIES.

1. Lower leaves alternate, crowded, the upper in whorls: stems woody .. .. 1. *rigida*
1. All the leaves in whorls.
  2. Perennial: stems more or less woody, at least at the base.
    3. Leaves revolute, subulate: stems stout, hairy: flowers subsessile .. .. 5. *asparagoides*
    3. Leaves flat: stems slender, glabrous: flowers pedicellate.
      4. Leaves ovate or obovate, thin: pedicels as long as the leaves .. .. 2. *sylvatica*
      4. Leaves lanceolate or linear-lanceolate, firm: Pedicels shorter than the leaves.
        5. Stems wiry: leaves flat: fruit brown, finely rugose .. .. 3. *Lichtensteiniana*
        5. Stems thread-like: leaves involute: fruit black, shining .. .. 4. *capillaris*
  2. Annuals: stems herbaceous.
    6. Perianth segments not imbricate, the edges pressed together and bent outwards .. .. 10. *physocalyx*
    6. Perianth segments imbricate.
      7. Perianth segments closely wrapped round the fruit and falling with it.
        8. Leaves linear or linear-lanceolate: fruit with a short oblique beak .. .. 6. *glomerata*

    8. Leaves oblanceolate: fruit not produced into a beak . . . . 9. *littoralis*
  7. Perianth segments spreading or loosely surrounding the fruit, not falling with it.
    9. Perianth in fruit ascending, finally deciduous: fruit laterally compressed, with a flat rough-edged beak . . . . 7. *Mollugo*
    9. Perianth in fruit spreading, persistent: fruit abruptly narrowed to a smooth beak . . . . 8. *congesta*

1. **A. rigida** (Bartl.) Sond. Fl. Cap. 1. 149. 1859. *Pharnaceum rigidum* Bartl. Linnaea 7. 626. 1832. *Psammotropha rigida* Fenzl Ann. Wien. Mus. 2. 266. 1840.

Stems many from the root, sprawling, 20—60 cm. long, slightly woody at the base, the lower part with crowded alternate ascending leaves, the upper with whorled leaves separated by internodes 3—7 cm. long, perennating from buds on either part. *Leaves* dark brownish-green, the lower linear, 1—3 cm. long, 0·1—0·15 cm. wide, acute or almost pungent, widened and slightly sheathing at the base, the upper similar but 0·5—1 cm. long. Stipules linear, thread-like, deciduous. Flowering portion with a few long and many short branches. *Flowers* axillary, subsessile, about 2 mm. long. *Perianth* segments obtuse, hooded, the green strip extending to the tip. *Anthers* yellow. *Fruit* ovoid, not longer than the perianth.

The type is *Ecklon* (Tygerberg) in herb. Sonder (S).

CAPE. Melkbosch Strand *Adamson* 4682: Maitland *Guthrie* 771 (CT): Rondebosch *Wolley-Dod* 3946, 3948 (BOL): Muizenberg *Bolus* 4521 (BOL, K): Fishhoek *Wolley-Dod* 3415 (K): Kommetje *Adamson* 2228 (CT): *Wolley-Dod* 3415 (BM, K).

CALEDON. Houwhoek *Schlechter* 7371 (BM, BOL, GRA, K, SAM). Without locality:—*Harvey* 461 (BM, K): s.n. (K).

2. **A. sylvatica** (E. & Z.) Fenzl Ann. Wien. Mus. 2. 275. 1840. *Steudelia sylvatica* E. & Z. Enum. 283. 1836. *S. viridis* Gandog. Bull. Soc. Bot. Fr. 59. 708. 1912.

Slender, sprawling or almost scandent, herbaceous or slightly woody. *Stems* brown, glabrous, 50—100 cm. long, branched. *Leaves* in distant whorls usually of 4, persistent, ovate or ovate-lanceolate, 3—8 mm. long, 1—4 mm. wide, pale green, thin, acute, hair-pointed. Stipules small, reflexed, thread-like, about 1 mm. long. *Flowers* in the upper axils: pedicels thread-like, as long as or longer than the leaves, often appearing as if below the leaves. *Perianth* segments 2 mm. long, white with a narrow green midrib, obtuse, cucullate. *Anthers* yellow. *Fruit* rotund-ovate, slightly compressed laterally, not prolonged at the top, brown, finely granulate.

The type is *E. & Z.* 1809 in herb. Berlin, co-type in S.

Sheltered places by streams or under rocks on the lower mountain slopes.

WORCESTER. Louwhoek Peak *Stokoe* (SAM).

STELLENBOSCH. Helderberg, *Galpin* 12390 (PRE), 12391 (K): *Parker* 4543 (BOL, K, NBG): *Salter* 4238 (BOL, K, PRE): Diep Gat Ravine, *Esterhuysen* 12514 (BOL, NBG, PRE): Haalhoek Spitzkop, *Esterhuysen* 13549 (BOL).

PAARL. Franschhoek, *E. P. Phillips* 1135 (SAM): Wemmershoek, *Esterhuysen* 11276 (BOL, NBG): April Peak, *Esterhuysen* 4023 (BOL, NBG, PRE): Seven Sisters, *Stokoe* (SAM).

CALEDON. Somerset Sneeuwkop, *Stokoe* (SAM): Caledon, *Bolus* 9144 (BOL, K): Swartberg, *Ecklon & Zeyher* 1809 (SAM), 2488 (K, PRE, SAM): *Galpin* 4081 (GRA, PRE): *Schlechter* 9770 (BM, BOL, GRA, K, PRE): *Zeyher* s.n. (SAM): River Sonderende *Schlechter* 5622 (BM, BOL, GRA, K, PRE).

SWELLENDAM. Voormansbosch, *Zeyher* 2 (SAM).

LADISMITH. Swartberg, *Adamson* 3694 (CT): Water Kloof, *Hutchinson* 1120 (K).

RIVERSDALE. Langeberg, *Schlechter* 1977 (BM, GRA).

UNIONDALE. Kamanassie Mts., *Esterhuysen* 16486 (BOL).

UITENHAGE. Otterford, *Rodin* 1133 (BOL, PRE). Without locality:—*Drege* (*Mollugo aristata* a & b) (K, PRE), (*A. sylatica* a) (SAM).

3. **A. Lichtensteiniana** (Schult.) Druce Rep. Bot. Ex. Club. Br. Is. 1916. 603. 1917. *Pharnaceum Lichtensteinianum* Schult. Syst. 6. 626. 1820. *Mollugo Lichtensteiniana* Ser. in DC. Prodr. 1. 393. 1824. *Ph. diffusum* Bartl. Linnaea 7. 625. 1832. *Steudelia diffusa* E. & Z. Enum. 283. 1836. *A. diffusa* Fenzl Ann. Wien. Mus. 2. 275. 1840.

Stems wiry, woody at the base, sprawling, much branched, up to 1 m. long, glabrous, brown. *Leaves* in whorls of 6, 4 or 2, separated by internodes 0·5—2·5 cm. long, the lower deciduous. *Leaves* 3—5 mm. long, 1—2 mm. wide, firm, oblanceolate, acute, flat, green or brown, sometimes slightly glaucous. Stipules caducous. *Flowers* in groups of 2—5, most commonly 3, on pedicels 1—3 mm. long, usually shorter than the leaves. *Perianth* 1—2 mm. long, the segments obtuse, connate at the base, with a bulging green midrib for two-thirds their length. *Anthers* red or orange. *Fruit* rotund-pear-shaped, slightly compressed, acute at the tip, slightly ridged at the edge, brown, finely rugose, shorter than the perianth.

The type is *E. & Z.* 1811 in herb. Vienna, lectotype in SAM.

Sprawling among bushes on stony mountain and hill slopes.

Like *A. sylvatica* but readily recognised by the wiry stems, firm narrow leaves without hair-points, and the shorter pedicels.

CLANWILLIAM. Middelberg Plateau, *Compton* 12721 (NBG).

CERES. Cold Bokkeveld Mts., *Adamson* 4722, 4724: Ceres, *Bolus* 8363 (BOL, PRE).

PIKETBERG. Moutons Valley, *Pillans* 7540 (BOL).

WORCESTER. De Doorns, *Bolus* 13113 (BOL): Mostertshoek Twins, *Esterhuysen* 9903 (BOL).

STELLENBOSCH. Helderberg, *Salter* 4238 (BM): Gordons Bay, *Adamson* 4685, 4687: *Marloth* 10107 (PRE).

CAPE. Cape Town, *Guthrie* 1180, 1185 (CT), 4616 (BOL): Table Mt., *Adamson* 983 (BOL): *Bolus* 8363 (BOL): *Burchell* 8436 (K): *E. & Z.* 1811 (SAM): *Wilms* 3231 (BM, K): Devils Peak, *Rehmann* 1118 (BM): Camps Bay, *Adamson* 3536: *Burchell* 318 (K): *Barker* 3203 (NBG): *Wolley-Dod* 1721 (K): *Zeyher* 4806 (BOL): Kasteel Poort, *Zeyher* 4727 (BOL, GRA): Chapmans Peak *Compton* 15430 (NBG): Fishhoek, *Adamson* 2931 (CT): Simonsberg, *Wolley-Dod* 871 (K): Klaver Valley, *Salter* (BM): Simonstown, *Wright* (K): Smitswinkel Bay, *Lewis* (SAM): Patrys Vlei, *Salter* 8470 (BOL).

CALEDON. Sir Lowry Pass, *Penther* 2306 (BM): Steenbrass, *Adamson* 4689: Houwhoek, *Schlechter* 9379 (BM, GRA, K, PRE): Shaw's Mt., *Galpin* 4082 (GRA): Caledon, *Pappe* (SAM): *Zeyher* (SAM).

SWELLENDAM. Swellendam, *Bowie* (BM): Potteberg, *Adamson* 4802.

RIVERSDALE. Albertinia, *Muir* 2440 (PRE).

ALBANY. Bothasberg, *MacOwan* 1331 (SAM). Without locality:—*Drege* (*A. microcarpum*) (BM, K): *Masson* (BM): *Zeyher* 613 (SAM), 626 (K), 618 (BM, BOL, K).

4. **A. capillaris** (E. & Z.) Druce Rep. Bot. Ex. Club Br. Is. 1916. 603. 1917. *Steudelia capillaris* E. & Z. Enum. 283. 1836. *A. lampocarpa* E. Mey. ex Fenzl Ann. Wien. Mus. 2. 276. 1840.

Like *A. Lichtensteiniana* but much more slender and less woody. *Stems* very thin, thread-like. *Leaves* in whorls of 4, linear-lanceolate, more or less involute, shortly hair-pointed. Stipules minute. *Flowers* in groups of 2 or 3: pedicels short at first but lengthening at the fruiting stage to at least the length of the leaves. *Perianth* segments obtuse with a green central part. *Fruit* smooth, shining, almost black, more pointed than that of *A. Lichtensteiniana.*

The type is *E. & Z.* 1810 in herb. Berlin. Lectotype *Drege* s.n. (K).

Sheltered places usually by streams on mountains.

Closely allied to the preceding species but differing in the fruit.

WORCESTER. Stettynsberg, *Esterhuysen* 11104 (BOL): Du Toits Kloof, *Drege* (BM).

BREDASDORP. Elim, *Bolus* 8608 (BOL).

KNYSNA. Goukamma, *Burchell* 5595 (K). Without locality:—*Drege* s.n. (BM, K, PRE): *Masson* (BM).

5. **A. asparagoides** Adamson sp. nov.

Caules lignosi brevissime pilosi decumbentes ramosi ramis saepe oppositis ramulosis. Folia verticillata distantia linearia revoluta vel subulata. Florum pedicelli foliis breviores.

A sprawling Asparagus-like plant with many woody stems. *Stems* 25—50 cm. long, covered with very short hairs: internodes 3—5 cm. long. Branches usually in pairs. *Leaves* in distant whorls of 4—6, linear, 5—8 mm. long, revolute and apparently subulate, shortly hair-pointed: Stipules linear, soon falling. *Flowers* subsessile, in cymose groups of 3 in the uppermost axils, the pedicels much shorter than the leaves. *Perianth* segments obtuse, white with the green band less than half the length. *Ovary* slightly compressed vertically: *style* not symmetrical.

The type is *Esterhuysen* 5930 (BOL).

Very distinctive in habit and leaf.

CLANWILLIAM. Barrage, *Esterhuysen* 5930 (BOL).

6. **A. glomerata** (L.f.) Druce Rep. Bot. Ex. Club. Br. Is. 1916, 603. 1917. *Pharnaceum glomeratum* L.f. Supp. Pl. 185. 1781. *P. Mollugo* L. Sp. Pl. ed. 2. 389. 1763. *non* Mant. 2. 531. 1771. *A. Mollugo* Sieb. ex Bartl. Linnaea 7. 625. 1832 *non* Reichb. f. *Mollugo glomerata* Ser. in DC. Prodr. 1. 393. 1824. *Steudelia galioides* Presl Symb. Bot. 1. 4. 1829. (E. & Z. Enum. 283 1836). *A. galioides* Fenzl Ann. Wien. Mus. 2. 277. 1840.

A many stemmed herbaceous annual, prostrate, sprawling or semi-erect. *Stems* up to 50 cm. long, slender, glabrous, branched. *Leaves* in whorls usually of 6, with many at the base. Leaves linear, flat or involute, glabrous, hair-pointed, the basal 1—3 cm. long, the cauline 0·5—1·5 cm. often reflexed. *Flowers* numerous, in the upper axils. Pedicels 1—2 mm. long, shorter than the leaves. *Perianth* segments white with a green centre. *Anthers* yellow, orange or less often red. *Fruit* pear-shaped, slightly compressed, black when ripe, punctate, with a short usually oblique beak at the top. Perianth in fruit persistent, closely wrapping round and falling with the fruit.

The type is in herb. *Thunberg*, Uppsala

Common on sand at low altitudes. Abundant after fire or clearance. Very variable in size and habit. The lower leaves often turn orange, red or brown, and fall off in the later stages. Fenzl (l.c.) made two varieties, *planifolia* and *teretifolia* but these seem to be dependant on habitat conditions only.

S.W. AFRICA. Klinghardtbergen, *Dinter* 3927 (BOL, K, PRE).

NAMAQUALAND. Port Nolloth, *Bolus* 623 (BM, BOL, K, PRE, SAM): Nabapeep, *Bolus* 9527 (BOL): Garies, *Acocks* 14967 (PRE).

CALVINIA. Lokerberg, *Acocks* 17239 (PRE).

VAN RHYNSDORP. Van Rhyns Pass, *Adamson* 4548: Kareeberg *Schlechter* 8113 (PRE): Zandkraal, *Acocks* 14825 (PRE): Nardouw, *Maguire* 1043 (NBG): Klaver, *Adamson* 4225-6: *Lewis* (BOL).

CLANWILLIAM. Lamberts Bay, *Adamson* 4479, 4483: Graafwater, *Adamson* 4502: Pakhuis, *Adamson* 4515: Clanwilliam, *Adamson* 4493: Barrage, *Esterhuysen* 5930, 5940 *a* (BOL): Koupoort, *Esterhuysen* 12134 (BOL): Algeria, *Levyns* 3007 (CT): Olifants River, *Phillips* 7502 (K, SAM): *Stephens* 7305 (K): Olifants River Mts., *Howes* 208 (K): rd. to Elandsfontein, *Henrici* 3345 (PRE): Warm Baths, *Stephens* 7162-3 (K), 7164 (K): Grays Pass, *Adamson* 4473: *Godman* 563 *a* (BM): Swartboschkraal, *Schlechter* 5165 (BOL), 5168 (GRA).

PIKETBERG. Piketberg, *Tyson* 2315 (BOL): Het Kruis, *Stephens & Glover* 8725 (BM, BOL, K): Sauer, *Steyn* 555 (NBG): foot of Grays Pass, *Steyn* 628 (NBG).

CERES. Cold Bokkeveld Mts., *Adamson* 4706-7, 4709, 4719: Katbakkies, *Adamson* (SAM).

TULBAGH. De Hoek, *Lewis* (BOL).

WORCESTER. Bains Kloof, *Gillett* 216 (BOL): Hex River, *Tyson*, 631 (SAM): Du Toits Kloof, *Adamson* 4697.

MALMESBURY. Malmesbury, *Leighton* 608 (BOL): Mamre, *Wasserfall* 446 (NBG): Berg Riv., *Leighton* 615 (BOL): Bok Point, *Compton* 9392 (NBG): Hopefield, *Bolus* (BOL): Centerberg, *Pillans* 8916 (BOL).

STELLENBOSCH. Strandfontein, *Adamson* 4737: Strand, *Parker* 3593 (BOL, NBG): Gordons Bay, *Parker* 4115 (NBG): Stellenbosch, *Duthie* 730 (BOL): Jonkershoek, *Garside* 1174 (K).

CAPE. Melkbosch Strand, *Adamson* 4668: Durbanville, *Adamson* 4690: *Compton* 16031 (NBG): *Henderson* 1202 (NBG): Bellville, *Rogers* 16338 (K): Cape Flats, *Bolus* 2720 (BM, K): *Adamson* 4570: *Wolley-Dod* 3325 (BOL): Maitland, *Guthrie* 696 (CT): Cape Town, *Bolus* 4599 (BOL): *Pappe* (SAM): *Salter* 271/18 (BM): *Zeyher* (SAM): Table Mt., *Ecklon & Zeyher* 1808 (SAM), s.n. (PRE): *MacOwan* 815 (BM, BOL, K, SAM), 2755 (GRA): *Rehmann* 858 (BM): Lion's Head, *Bolus* 2720 (BOL, K): *Kensit* (CT): *WolleyDod* 2779 (BM), 3094 (BOL, K): *Zeyher* (SAM): Devils Peak, *Ecklon* 628 (BM, K): *Levyns* (CT): Sea Point, *Tyson* 2452 (BOL): Green Point, *Pappe* (BOL): *Prior* (PRE): Camps Bay, *Marloth* 295 (PRE): Noordhoek, *Godman* 327 (BM): Mowbray, *Marloth* 336

(PRE): Rondebosch, *Adamson* 950 (BOL): *Wolley-Dod* 3325 (BOL, K): Wynberg, *Schlechter* 1513 (BM, BOL, GRA, K): Muizenberg, *Arbuthnot* (CT): Fishhoek, *Wolley-Dod* 3415 (BOL): Red Hill, *Adamson* 1982 (BOL): Millers Point, *Salter* 271/19 (BM).

CALEDON. Caledon, *Gillett* 1123 (BOL): Hermanus, *Galpin* 4082 (GRA, PRE).

SWELLENDAM. Storms Vlei, *Adamson* 4582: Swellendam, *Fries, Norlindh & Weimark* 1507 (BOL).

LADISMITH. Seven Weeks Poort, *Adamson* 4636.

RIVERSDALE. Riversdale, *Muir* 4781 (PRE): Albertinia, *Muir* 1016 (BOL, PRE).

GEORGE. Assequaskloof, *Zeyher* 2489 (BOL, SAM): Ronde Vlei, *Van Niekerk* 202 (BOL).

KNYSNA. Ruigte Vlei, *Fourcade* 1553 (BOL, GRA).

HUMANSDORP. Hancock, *Fourcade* (BOL).

Without locality:—*Alexander* (BM, PRE): *Drege* (*A. microcarpa* a & d) (BM, K, PRE): *Grey* (K): *Masson* (BM): *Oldenburg* (BM): *Zeyher* 614 (K), 620 (BM, BOL, K, PRE, SAM), s.n. (SAM).

7. **A. Mollugo** Reichb. f. Icon. Bot. Exot. 2. 3. t. 109. 1828.

A slender annual. *Stems* more or less erect, up to 30 cm. high but commonly 5—15 cm., the branches usually wide-spreading and often apparently dichotomous. *Leaves* in whorls of 4—6, the basal more numerous, 4—8 mm. long, 0·5—1·5 mm. wide, linear, flat, acute but often not aristate, commonly ascending and more or less glaucous. *Flowers* rather crowded, on very short pedicels, the flowering whorls often close. Flowers like those of *A. glomerata* but the perianth segments white with a small green centre. *Anthers* usually red. *Fruit* brown or almost black, rotund at the base, abruptly or gradually narrowed to a broad flat rough-edged beak. The whole fruit punctate or rugose. Perianth in fruit elongating to twice its length, loosely surrounding the fruit and deciduous before it.

The type is *Reichb.* t. 109. l.c.

Open sand especially where damp in spring.

Variable in size. The basal leaves wither before fruiting time. Much like *A. glomerata* and not easily distinguished in the absence of fruit.

NAMAQUALAND. Kamiesberg, *E. P. Phillips* 7502 (SAM).

VAN RHYNSDORP. Giftberg, *Steyn* 413 (BOL, NBG): Kareeberg, *Schlechter* 8173 (BOL, GRA, K), 8193 (BM): Sandkraal, *Wilman* 918 (BOL): Van Rhyns Pass, *Salter* 1632 (BM): *L. E. Taylor* 2853 (NBG): Klaver, *Wilman* 829 (BOL).

CLANWILLIAM. Clanwilliam, *Adamson* 4495: *Guthrie* (NBG): *Schlechter* 5070 (BM, BOL, GRA, K): Barrage, *Smuts* 2005 (PRE): Zeekoe Vlei, *Levyns* 1252 (CT): Graafwater, *Adamson* 4508: Alpha, *Compton* 10931 (NBG): de Hoek, *Schlechter* 8706 (BOL, GRA, K, PRE): Brandewyn Riv., *Maguire* 243 (NBG): Pakhuis Pass, *Godman* 563 *a* (BM): Nieuwoudt Pass, *Esterhuysen* 8129 (BOL): Algeria, *Salter* 7559 (BOL): Olifants Riv., *Steyn* 494 (NBG): *Wilman* 829 (BOL): Citrusdal, *Leighton* 1088 (BOL): *Thorne* (SAM): Alexandershoek *Schlechter* 5160 (BOL, GRA, PRE).

PIKETBERG. Papkuil *Leighton* 118 (BOL): Kapiteins Kloof, *Pillans* 8000 (BOL): Berg Riv., *Leighton* 415-43 (NBG).

CERES. Klein Vlei, *Adamson* 4712-3, 4717: Gydo, *Hutchinson* 1052 (BOL, K).

TULBAGH. Steendal, *Pappe* (K): Tulbagh, *Zeyher* (SAM): Tulbagh Kloof, *Andreae* 658 (PRE).

WORCESTER. Worcester, *Cooper* 2310 (K): Sanddrift Kloof, *Esterhuysen* 15966 (BOL).

MALMESBURY. Mamre, *Marloth* 8983 (*Baur*) (PRE).

CAPE. Melkbosch Strand, *Adamson* 4680: Milnerton, *Adamson* 2594, 3217: Raapenberg, *Guthrie* 1187 (CT): Green Point, *Ecklon & Zeyher* 1812 (SAM): Rondebosch, *Wolley-Dod* 2885 (BM, BOL, K), 3498 (K): Muizenberg, *Eckon & Zeyher* 1812 (SAM): Sirkels Vlei, *Adamson* 1160A (BOL, CT)?.

Without locality:—*Drege* (A. microcarpa b & c) (K): "Hort. Kew" (BM): *Sieber* 261 (K).

8. **A. congesta** Adamson sp. nov.

A. Mollugine affinis sed differt caulibus minoribus procumbentibus, internodiis brevissimis, floribus congestis, perianthii segmentis anthesin patenti-rotatis, fructibus subdiscoideis in acumine laeve compresso abrupte productis.

A small spreading or rarely suberect many-stemmed annual. *Stems* 5—20 cm. long. *Leaves* in whorls of about 6, the whorls close, the upper crowded. Leaves 3—4 mm. long, 1 mm. or less wide, flat, acuminate, aristate. Stipules caducous. *Flowers* crowded. Pedicels 1—1·5 mm. long. *Perianth* segments rotate-spreading, 1—1·5 mm. long, obtuse, the outer almost flat, the inner cucullate. *Anthers* yellow. *Fruit* smooth, almost discoid, at the top abruptly narrowed to a smooth flattened often asymmetrical beak 1—1·5 mm. long. Fruit falling without the persistent perianth.

The type is *Adamson* 4693 (BOL).

A local endemic on damp sand.

Like *A. Mollugo* but quite different in the fruit and fruiting perianth.

WORCESTER. Goudini Baths, *Adamson* 4408: Slanghoek, *Adamson* 4693: Matroosberg, *E. P. Phillips* 2030 (SAM).

9. **A. littoralis** Adamson sp. nov.

Annua ramosissima. Folia parva oblanceolata superiora minima. Flores numerosi foliis longiores. Perianthii segmenta imbricata. Fructus rotundus subcompressus subcarinatus apice acutus perianthio inclusus.

A much branched more or less prostrate pale green annual, the older parts often orange-red. *Stems* slender, 5—15 cm. long. *Leaves* in whorls of 4—6, flat, oblanceolate, 4—6 mm. long, 1·5—2 mm. wide, rounded at the tip, narrowed to the base, the uppermost very small. Stipules membranous, caducous. *Flowers* crowded at the branch tips: pedicels straight, 2—2·5 mm. long. *Perianth* 1—1·5 mm. long, the segments obtuse, hooded, the green band narrow. *Anthers* yellow. *Fruit* brown, punctate or finely rugose, rotund, slightly compressed laterally, with a distinct smooth marginal keel, the tip acute, not prolonged as a beak. Fruit closely wrapped round by and falling with the perianth.

The type is *Adamson* 4704 (BOL).

Open sand at low altitudes, especially near the sea.

Readily distinguished by the broad leaves, crowded flowers and the fruit.

The specimens distributed by Schlechter under the MS name *A. spagnocarpa* belong to this species.

NAMAQUALAND. Hondeklip Bay, *Pillans* (BOL).

VAN RHYNSDORP. Kareeberg, *Schlechter* 11385 (BM, BOL, GRA, K, PRE).

PIKETBERG. Moutons Vlei, *Pillans* 7514 (BOL).

CALEDON. Cape Hangklip, *Adamson* 4413, 4704.

10. **A. physocalyx** Fenzl Ann. Wien. Mus. 2. 276. 1840. *A. Dregeana* Gandog. Bull. Soc. Bot. Fr. 59. 709. 1912.

A small many-stemmed annual, 5—15 cm. high. *Leaves* in whorls usually of 6, linear-filiform, 4—6 mm. long. *Flowers* crowded. Pedicels 3—4 mm. long. *Perianth* 2—3 mm. long, the segments green with a narrow white margin, not imbricate, the edges pressed together and bent outwards. *Fruit* shining, black, pear-shaped, slightly compressed, at the top gradually narrowed to a smooth symmetrical beak. Fruit completely hidden by the enlarged bladder-like perianth and falling with it.

The type is *Drege* (Breede Riv.) (W), lectotype in BM.

Rare in damp places at low altitudes.

The plants described as *A. Dregeana* only differ in having larger flowers.

PAARL. Franschhoek, *E. P. Phillips* 1134 (SAM).

CALEDON. Bot River, *Adamson* 4252 (CT).

SWELLENDAM. Breede Riv., *Drege* s.n. (BM): *Zeyher* 2500 (K, SAM).

Without locality:—*Drege* (*A. homalocarpa*) (BM, K).

POLPODA.

Presl Symb. Bot. 1. 1. t. 1. 1829.

Blepharolepis Nees in Lindl. Nat. Syst. ed. 2. 442. 1836.

Shrublets. *Leaves* small, alternate, appressed, with large membranous fringed stipules. *Flowers* solitary, axillary, subsessile, each with a leaf-like stipulate bract and two bracteoles. *Perianth* segments 4 or 5, with membranous or fringed tips. *Stamens* as many as the perianth segments and alternating with them: *anthers* exserted. *Ovary* superior, 2-chambered, each chamber with one basal ovule: *styles* 2: *stigmas* small. *Fruit* compressed, splitting along the edge.

The type species is *P. capensis* Presl.

Species 2, confined to the S.W. Cape. A genus very distinctive in habit. Flowers protandrous and wind pollinated: large quantities of dusty pollen are produced.

Key to the Species.

1. Leaves crowded, overlapping: flowers 4-merous: perianth fringed: stamens free . . . . 1. *capensis*

1. Leaves scattered: flowers 5-merous: perianth not fringed: stamens connate at the base . . . . 2. *stipulacea*

1. **P. capensis** Presl l.c. *Blepharolapia Eckloniana* Nees. l.c.

A silvery-gray woody shrublet, 20—50 cm. high, erect or sprawling. Branches distant, in groups of 2 or 3, ascending or divaricate. *Leaves* covering the stems, overlapping, oblong-linear, 2—4 mm. long, acute, usually bent outwards at the tips. Stipules membranous, lacerate, longer than and partly covering the leaves. *Flowers* sessile, numerous: bracts 3-fid, 4 mm. or more wide at the base, the central lobe linear 2 mm. long, acute, more or less recurved and soon deciduous, the lateral lobes shorter, 1 mm. long: stipules large, like those of the leaves. Bracteoles small, green, ovate, subacute. *Perianth* shorter than the bracts, the segments 4, hairy on the back, membranous and lacerate at the tip. *Stamens* free; filaments 2—3 times as long as the yellow or orange anthers.

The type is *Presl* l.c. t. 1.

Sand or gravel at low altitudes. Never abundant but rather widespread. The stems continue vegetative growth after flowering.

CLANWILLIAM. Graafwater, *Adamson* 4504: Oudebosch Kloof, *Esterhuysen* 14291 (BOL): Algeria, *Esterhuysen* 7846 (BOL, NBG): Elands Kloof, *Esterhuysen* 4194 (BOL): Keerom, *Esterhuysen* 17877 (BOL).

PIKETBERG. Piketberg, *Zeyher* 1450 (GRA, SAM).

TULBAGH. Tulbagh, *Schlechter* 7510 (BM, GRA, K).

WORCESTER. Orchard, *Esterhuysen* 10938 (BOL): Brand Vlei, *Bond* 376 (NBG).

PAARL. Pic Blanche, *Esterhuysen* 1667 (BOL): Wemmershoek, *Esterhuysen* 17671 (BOL): Klapmuts, *L. Bolus* (BOL).

STELLENBOSCH. Helderberg, *Parker* 4721 (BOL, NBG, SAM).

CAPE. Milnerton, *Adamson* 2573 (CT): Maitland, *Guthrie* 402 (CT): Cape Town, *Harvey* (BM): Table Mt., *Burchell* 44 (K): *Ecklon* (SAM): *Penfold* 280 (NBG): *Zeyher* 1450 (BOL, K, SAM): Devils Peak, *MacOwan* 2972 (SAM): *Tyson* (SAM): *Zeyher* (SAM): Camps Bay, *Burchell* 327 (K): *Ecklon* (SAM): *Miers* (BM): *Zeyher* (SAM): Muizenberg Pipe Track, *Salter* 271/15 (BM): Steenberg, *Adamson* 2116 (CT): Clovelly, *Salter* 4271 (K): Glencairn, *Stokoe* (SAM): Slangkop, *Bond* 1500 (NBG): *Compton* 18019 (NBG): Smitswinkel, *Compton* 15509 (NBG): *Leighton* 379 (BOL): *Salter* 7899 (BOL, NBG).

CALEDON. Rooi Els, *Parker* 4400 (BOL, NBG): Genadendal, *Burchell* 7975 (K).

BREDASDORP. Ratel Riv., *Adamson* 4784.

SWELLENDAM. Breede Riv., *Burke* (K): *Wallich* (K).

MOSSEL BAY. Mossel Bay, *Burchell* 6232 (K).

Without locality:—*Drege* 8262 *b* (BM, K): *Masson* (BM): *Niven* (BM): *Sieber* 151 (K).

2. **P. stipulacea** (Leighton) Adamson comb. nov. *Psammotropha stipulacea* Leighton J. S. Af. Bot. 13. 61. 1947.

A small erect or diffuse shrublet, 15—30 cm. high. *Stems* glabrous, with many erect or ascending branches. *Leaves* more or less scattered, as long as or shorter than the internodes, ovate or oblong, 3—5 mm. long, 1—1·5 mm. wide, concave below, acute at the tip or mucronate with a small bristle. Stipules coarsely lacerate, about half as long as the leaves. *Flowers* on pedicels 1—1·5 mm. long. Bracts like the leaves but with larger and less cut stipules. *Perianth* segments 5, about 1 mm. long, cucullate, green with a membranous edge. *Stamens* 5, as long as the perianth or slightly longer, the *filaments* distinctly connate at the base: *anthers* pale yellow.

The type is *Leighton* 2189 (SAM).

Rocky or stony lower slopes and flats.

Though originally assigned to the genus *Psammotropha* this agrees with the present genus in the habit, the alternate leaves with large lacerate stipules, the solitary axillary flowers and bicarpellary ovary. Indeed, it only differs in the 5-merous flowers with the perianth not lacerate and the connate stamens.

CLANWILLIAM. N. Cedarberg, *Esterhuysen* 12067 (BOL): Pakhuis, *Esterhuysen* 14969 (BOL): Algeria, *Esterhuysen* 18173 (BOL): Keerom, *Esterhuysen* 17898 (BOL).

PIKETBERG. 24 Rivers, *Esterhuysen* 16115 (BOL): Saron, *Adamson* 1035.

CERES. Upper Olifants Riv., *Esterhuysen* 14312 (BOL, K): Wilman 14321 (K) Cold Bokkeveld Mts., *Adamson* 4716.

WORCESTER. Romans Riv., *Leighton* 2189 (BOL, K, NBG, SAM): Darling Bridge, *Esterhuysen* 6085 (BOL): Botha Siding, *Compton* 18702 (NBG).

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BOOK REVIEW.

THE GENUS MURALTIA. By Margaret R. Levyns. Jnl. S.A.F. Bot., Suppl. Vol. II, 1954. Cape Town. pp. 247. 2 plates, 37 maps and 87 figs. 35s.

The genus Muraltia, in the Family Polygalaceae, is, unlike the large cosmopolitan genus Polygala, entirely confined to South Africa. In most of the species the small pink or purple flowers are rather inconspicuous and many of them are superficially very similar in appearance. The flowers are far less showy than those of Polygala to which Muraltia might be described as a poor relation.

Muraltia has hitherto been looked upon by botanists as a very difficult genus, and until recent years it has been rather neglected by collectors, particularly amateurs, perhaps owing to the difficulty in naming the plants from existing literature. Almost all previous study of the genus has been founded on dried specimens in Europe, without field study, and, as Dr. Levyns has shown, this genus affords a striking example of the disadvantages, one might almost say futility, of purely herbarium work. Dr. Levyns emphasises the importance of the living plant and describes the rapid and very unequal development of the parts of each organ of the flower from the time of the emergence of the corolla to the moment of pollination. These changes are explained in detail and illustrated in Figure 1, in the case of the common species *Muraltia heisteria*.

It is therefore clear that when describing species, comparative measurements of the floral parts must be made at the same developmental stage. For this reason measurements given in most previous descriptions are almost meaningless because the stage of floral development is not given. In this revision the descriptions of the floral parts are all made at the same stage, i.e. when the crests on the carina have expanded and the maximum length of the parts has been attained. It is also shown that the leaf characters, to which emphasis was given in former descriptions, show marked changes in response to habitat and are of little taxonomic value.

Full notes on the morphology of the pollen grains in different species are given and the author shows that all the species are naturally self-pollinated, although hybridisation is sometimes brought about by insect pollination.

In several recent revisions of some of our fairly large South African genera, founded on field study, it has been noticed that although botanical exploration has been made easier by motor transport and, quite naturally, a large number of species new to botanical science has been discovered, yet the total number of species upheld has been reduced. Muraltia is no exception. Harvey in 1859, in the Flora Capensis Vol I, recognised 51 species, but by the time the author began her study of the genus, 67 further species had been described, principally by the botanists Chodat and Schlechter, bringing the total up to 118. Only 115 species are now upheld and since 37 of these are new species, this means that 40 of the 'herbarium-created' species are not deemed worthy of retention and have been sunk.

This drastic amalgamation or sinking of species is explained by the fact that many of those which have hitherto been thought separable have been found, as the result of more intensive field study, to belong to a series of geographical micro-variants, in which the extremes look at first sight sufficiently different for taxonomic separation. As more and more slight variants are discovered in such a series, it becomes apparent that the whole chain must be reduced to one very variable species.

The species are superficially so much alike that ordinary illustrations of the complete plants would be of little value. The author has therefore provided clear enlarged line drawings of the leaves, the floral organs, the capsule and the seeds of each species, variety and form and these 81 figures greatly help the reader in following the key and descriptions. All these figures have been drawn to the same scale which simplifies their comparison.

Full notes on the geographical distribution and the deductions that can be made as regards the gradual development and spread of the genus are accompanied by 37 maps on which the recorded occurrences of each species are plotted. Taking the genus as a whole, the highest concentration of species occurs in the Caledon Division and, with a very few minor exceptions, the number diminishes gradually to the northward to Namaqualand and to the eastward to the Uitenhage Division. The genus is, however, divided into two subgenera, Psiloclada with 16 species and Muraltia with 99. In the more primitive subgenus Psiloclada most of the species are confined to the mountains and show their highest concentration in the mountainous Divisions of Tulbagh and Worcester. Several species have a wide general distribution, a few show a marked discontinuity in distribution which the author suggests may be due to past geological changes, while 37 species are exceedingly local, occurring mostly in the coastal areas which are known to have been submerged by the sea in recent geological times. Finally some very interesting notes are given on hybridisation in the Cape Peninsula.

The monograph is the result of eight years of study during which the author collected very widely in the Western Province and was also able to inspect the collections in the principal herbaria in Europe. She pays a special tribute to the help given to her by Miss E. Esterhuysen for her copious collecting, especially in the high mountains, and for her valuable field notes, many of her specimens having proved to be new species.

Dr. Levyns' revision of Muraltia is quite the most detailed monograph which has appeared on any large South African genus and she deserves the thanks of all botanists for disentangling the many problems in nomenclature which have chiefly arisen through past misidentification, and for making it possible to distinguish the species, a task that has previously been impossible from existing literature. Such work could never have been achieved from the examination of herbarium specimens alone.

This Supplementary Volume of the Journal of South African Botany has been very well produced. The figures and maps have been very clearly printed and one may search in vain for misprints.

T. M. SALTER.

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ENKELE NUWE ROMULEA-SPECIES

Deur Miriam P. de Vos.

(*Afdeling Plantkunde, Universiteit van Stellenbosch.*)

Romulea attenuata sp. nov.

Connectivis supra apices antherarum exsertis, longissimis attenuatisque, bene distinguitur.

Planta 15—40 cm. alta. *Cormus* subglobosus, 8—20 mm. diam., ad basin oblique complanatus, tunicis rigidis laevibus brunneis, apice fibris 5—10 mm. longis praedito, ad basin costa lunata ciliata. *Caulis* 3·5—25 cm. longus, plerumque 6—15 cm., supra vaginas exsertus, tenuis, suberectus vel leviter flexuosus, simplex aliquando ramosus. *Vaginae basilares* 2. *Folia radicalia* 2, filiformia, tenuissima, suberecta vel leviter flexuosa, 15—40 cm. longa, 0·5—0·8 mm. diam., quadricostata nervis tenuissimis, cryptis stomatiferis clausis, basibus vaginantibus 2—3 mm. latis; *folia caulina* 1—2 aliquando 3, foliis radicalibus similia sed breviora. *Pedunculus* 1·5—6 cm. longus, erectus vel flexuosus, e vaginis foliorum caulinorum exortus. *Bractea* lanceolata, viridis, 15—25 mm. longa et ad 30 mm. longa, 5—8 mm. lata, acuta, plerumque marginibus membranaceis angustissimis albis. *Bracteola* bracteae similis sed marginibus latioribus. *Flores* 1—2 aliquando plures, 3—4·5 cm. longi. *Perianthii tubus* 5·5—8 mm. longus, ad basin angustus; *segmenta* 25—35 mm. longa, 7—11 mm. lata, acuta vel subobtusa, alba, ad basin fusca, segmenta exteriora oblonga, a dorso rosea, lilacina fuscaque notata, segmenta interiora oblanceolata, aliquando apiculata. *Stamina* erecta, exserta, infra dimidium perianthii tubi adnata; filamenta 6 mm. longa, ad basin pilifera; antherae 12—15 mm. longae, luteae, connectivis elongatis attenuatis, 2·5—5 mm. vel ad 6 mm. supra loculos antherarum exsertis. *Stylus* 12—16 mm. longus, stigmatibus fere ad dimidium antherarum attingentibus. *Ovarium* 2·5—3 mm. longum, 1·5—2 mm. diam.

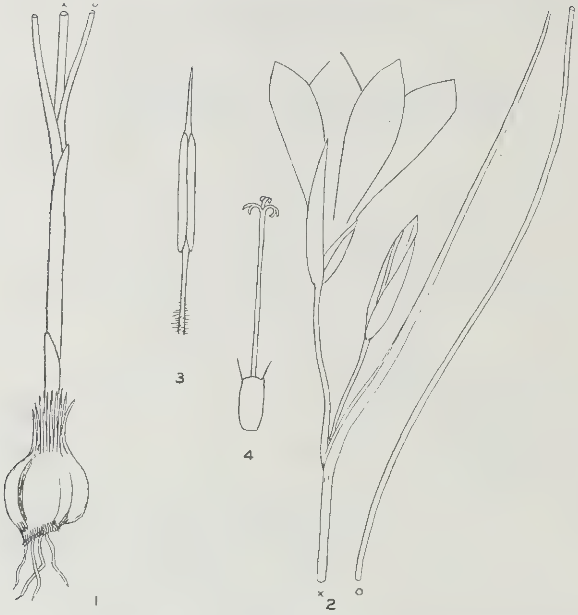

Fig. 1. *Romulea attenuata.* 1, 2, plant, natuurlike grootte; 3, meeldraad, × 2; 4, stamper, × 2.

Kaapprovinsie. Piketberg-distr.: op Piketberg, Julie 1937, *Stokoe* 4576a, in BOL. Op plato, Piketberg, Julie 1937, *Stokoe* 4576, in BOL. Clanwilliam-distr.: Elandsfontein, in rotsagtige skeure, Mei 1946, *Leipoldt* 4247, in BOL. (*tipe*) en PRE. Van Rhynsdorp-distr.: top van Gifberg, Mei 1938, *Salter* 7291, in BOL.

Suid-Afrika, sonder nadere gegewens: onder *R. arenaria* Eckl. ex Hb. Klatt, in S. ex parte; onder *R. flexuosa* Klatt en *R. rosea* var., ex Hb. Klatt, in S., ex p. (beide gemeng met *R. bulbocodioides*).

Plant 15—40 cm. hoog. *Knol* ongeveer bolrond, 8—20 mm. in deursnee, skuins afgeplat aan die basis, met tunicae hard, glad, bruin, aan die top gesplits in skerp tande 5—10 mm. lank, en met 'n klein hoefvormige rif aan die basis met fyn parallelle veseltjies beset. *Stingel* 3·5—25 cm. lank, gewoonlik 6—15 cm., bo die grond tevoorskyn tredend, dun, nagenoeg regop of effens gebuig, onvertak of soms vertak. *Basale skedes* 2, 1·5—7 cm. lank. *Grondstandige blare* 2, filiform, baie dun, nagenoeg regop of gebuig, 15—40 cm. lank, 0·5—0·8 mm. breed, 4-ribbig, met baie dun are en geslote huidmondjiegroewe, en met smal blaarbasisse 2—3 mm.

breed; *stingel-blare* 1 of 2, soms 3, gelyk aan die grondstandige blare maar korter en met effens breër blaarbasisse. *Blomsteel* 1·5—6 cm. lank, gewoonlik 2—4 cm., regop of gebuig, tevoorskyntredend uit die oksels van die stingelblare. *Skutblaar* lansetvormig, groen, 15—25 mm. of tot 30 mm. lank, 5—8 mm. wyd, gewoonlik met baie smal wit vliesige rande, tot die middel van die blomdek of hoër reikend, skerp. *Skutblaartjie* gelyk aan die skutblaar maar met breër wit rande. *Blomme* 1—2 of soms meer, 3—4·5 cm. lank. *Blomdekbuis* 5·5—8 mm. lank, smal aan die basis; *lobbe* 25—35 mm. lank, 7—11 mm. wyd, skerp tot nagenoeg stomp, wit met die basis bruinerig, die buitenste lobbe langwerpig, met rooskleurige, ligpers en bruin vlekke op die rug, die binneste lobbe omgekeerd lansetvormig, soms geapikuleerd. *Meeldrade* regop, bo die middel van die blomdek reikend, onder die middel van die blomdekbuis ingeplant; helmdrade 6 mm. lank, behaard aan die basis; helmknoppe 12—15 mm. lank, geel, met verlengde spitslopende helmbindsels 2·5—5mm. en tot 6 mm. langer as die helmhokke. *Styl* 12—16 mm. lank, met stempels tot die middel van die meeldrade reikend of laer. *Vrugbeginsel* 2·5—3 mm. lank, 1·5—2 mm. in deursnee.

Blomtyd Mei tot Julie. Hierdie species verskil van alle ander Suid-Afrikaanse Romulea-species in die lang spitslopende helmbindsels wat tot 5 of 6 mm. bo die helmhokke reik. Dit word meestal op berge en bergrante aangetref.

Dit is naverwant aan wat as *R. bachmannii* Beg. var. *angustifolia* Beg. bestempel is, wat gewoonlik op laerliggende sandvlaktes voorkom, en verskil daarvan hoofsaaklik in die verlengde helmbindsels.

Dit het dieselfde knoltipe as *R. bulbocodioides* Bkr., maar verskil van die wit vorm hiervan in die groener skutblaartjies en smaller blare.

Romulea namaquensis sp. nov.

Tubo perianthii ca. 1 cm. longo infundibulariforme, perianthio lilacino, foliis angustissimis filiformibus flexuosis, distinguitur.

Planta 7—17 cm. alta. *Cormus* obovoideus vel subglobosus, 6—9 mm. diam., ad basin oblique complanatus, tunicis rigidis laevibus brunneis, apice fibris 5—8 mm. longis praedito, ad basin costa lunata ciliata. *Caulis* brevis vel ad 4 cm. longus, vaginis foliorum obtectus, aliquando parum exsertus. *Vaginae basilares* plerumque 2. *Folia* 3—6, radicalia, filiformia, flexuosa, tenuissima, 7—17 cm. longa, 0·3—0·7 mm. diam., quadricostata sed costis cryptisque stomatiferis vix manifestis, basibus vaginantibus 2—3 mm. latis. *Pedunculus* 2—4 cm. longus, erectus vel leviter arcuatus, tenuis. *Bractea* lanceolata, viridis, 15—20 mm. vel ad 22 mm. longa, 5—6 mm. lata, plerumque infra dimidium perianthii attingens, apice obtuso vel subacuto. *Bracteola* bracteae subsimilis sed marginibus latissimis membranaceis albis, brunneopunctatis vel brunneolineatis in margine, apice emarginato vel obtuso. *Flores* 1—3, 3—4·5 cm. longi. *Perianthii tubus* ca. 10 mm. aliquando ad 12 mm. longus, infundibulariformis, angustus in dimidio inferiore, ad faucem dilatatus; *segmenta* 20—28 mm. longa, 7—9 mm. lata, obovato-lanceolata, lilacina vel rosea intus, 5-nervata in fauce, nervis violaceis, obtusa vel minute emarginata, segmenta exteriora a dorso rosea, irregulariter pallido-maculata. *Stamina* erecta, exserta, prope dimidium perianthii tubi adnata; filamenta 6—7 mm. longa, ad basin leviter pilifera; antherae 6—8 mm. longae, luteae. *Stylus* 16—20 mm. longus, stigmatibus parum supra vel infra apices antherarum attingentibus. *Ovarium* subglobosum vel oblongum, 2·5—3 mm. longum, 1·5—2 mm. diam.

KAAPPROVINSIE. KLEIN-NAMAKWALAND: Kamiesberge, voetpad tussen Witsand en Leliefontein, Sept. 1911, *P. Sladen Mem. Expdt.* na die Kamiesberge ens. 6656, in BOL. (*tipe*) en K. Kloof naby Kamieskroon, Sept. 1941, *Leipoldt* 3831, in BOL. Kamieskroon, Julie 1941, *Esterhuysen* 5460, in BOL. Dieselfde vindplek en datum, *Compton* 11170, in NBG. Naby Kamieskroon langs pad na Leliefontein, Aug. 1951, *de Vos* 1617, in STE.

Plant 7—17 cm. hoog. *Knol* omgekeerd eiervormig of nagenoeg bolrond, 6—9 mm. in deursnee, skuins afgeplat aan die basis, met tunicae hard, glad, bruin, aan die top gesplits in vesels 5—8 mm. lank, en met 'n klein hoefvormige rif aan die basis met fyn parallelle veseltjies beset. *Stingel* kort of tot 4 cm. lank, deur die blaarbasisse verberg of soms effens tevoorskyntredend. *Basale skedes* gewoonlik 2, 0·7—4·5 cm. lank. *Blare* 3—6, grondstandig, filiform, gekronkeld, baie dun, 7—17 cm. lank, 0·3—0·7 mm. in deursnee, 4-ribbig maar met die ribbe en huidmondjiegroewe skaars sigbaar, met smal blaarbasisse 2—3 mm. breed. *Blomsteel* 2—4 cm. lank, gewoonlik tevoorskyntredend vanuit die blaarbasisse, regop of effens gebuig, dun. *Skutblaar* lansetvormig, groen, 15—20 mm. of soms tot 22 mm. lank, 5—6 mm. breed, gewoonlik onder die middel van die blomdek reikend, met 'n stomp of nagenoeg skerp groen punt. *Skutblaartjie* ongeveer gelyk aan die skutblaar of effens langer of korter, maar met breë vliesige wit rande wat bruingestippel of bruin-gestreep aan hul rande is, met die top uitgerand of stomp. *Blomme* 1—3, 3—4·5 cm. lank. *Blomdekbuis* ongeveer 10 mm. of soms tot 12 mm. lank, tregtervormig, smal in die onderste helfte maar wyer in die keel; *lobbe* 20—28 mm. lank, 7—9 mm. breed, omgekeerd eier-lansetvormig, binne roos- of lilakleurig met 5 smal pers strepe in die keel, stomp of effens uitgerand, die buitenste lobbe rooskleurig met onreëlmatige ligte vlekke buite. *Meeldrade* regop, uitgestoot, ingeplant naby die middel van die blomdekbuis; helmdrade 6—7 mm. lank, effens behaard aan die basis; helmknoppe 6—8 mm.

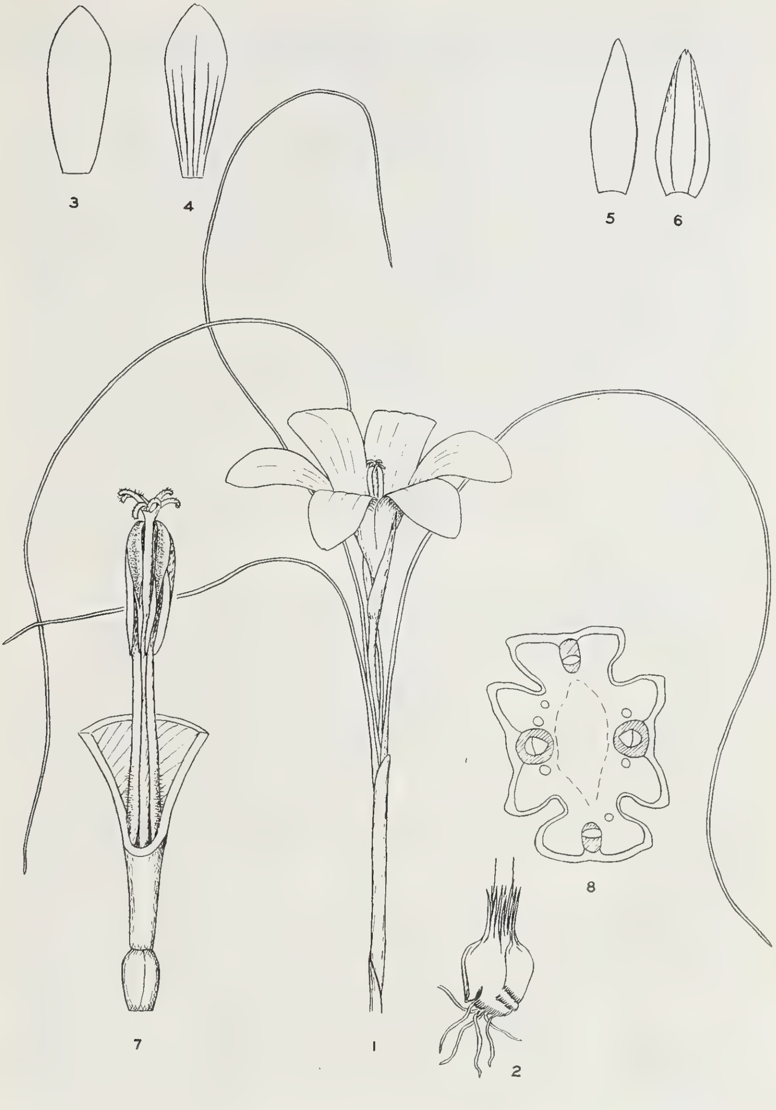

FIG. 2. *Romulea namaquensis.* 1, plant; 2, knol, × 1·5; 3, buitenste blomdeklob; 4, binneste blomdeklob; 5, skutblaar, × 1·5; 6, skutblaartjie, × 1·5; 7, deel van blomdekbuis, meeldrade en stamper, × 3; 8, dwarssnee deur loofblaar, × 40. 1, 3, 4, natuurlike grootte.

lank, geel. *Styl* 16—20 mm. lank, met die stempels effens bo of onder die toppe van die helmknoppe reikend. *Vrugbeginsel* nagenoeg bolrond of langwerpig, 2·5—3 mm. lank, 1·5—2 mm. in deursnee.

Blomtyd Julie tot September. Hierdie soort wat nog net in die omgewing van Kamieskroon en die Kamiesberge gevind is, word veral gekenmerk deur 'n blomdekbuis ongeveer 1 cm. lank: dus nie so lank soos by *R. macowani* Baker, *R. longituba* L.Bol., en *R. syringodeoflora* de Vos nie maar heelwat langer as by die ander Romulea-soorte. Van eersgenoemde verskil dit verder in die blomkleur en in die grotendeels groen kruidagtige skutblare en skutblaartjies; ook is die basale rif van die knol anders geleë. Waarskynlik is dit nie baie naverwant aan hierdie twee soorte nie, en van *R. syringodeoflora* staan dit nog verder.

Dit is naverwant aan 'n ander nog onbeskryfde soort van Namakwaland, en verskil hiervan hoofsaaklik in die lang blomdekbuis met helmdrade in die middelhoogte ingeplant.

By 'n plant wat by die Universiteit van Stellenbosch geblom het was die vrugte ongeveer bolrond en 3 mm. in deursnee. Of dit die normale vrugvorm is, is onseker, want in elkeen van hierdie vrugte het net 'n paar sade ryp geword.

Romulea thodei Schlechter subsp. *gigantea* subsp. nov.

A typo planta et omnibus partibus majoribus, stigmatibus antheras superantibus, distinguitur.

Plant 25—45 cm. hoog. *Knol* 10—18 mm. in deursnee, met 'n punt of baie kort rif aan die basis, die tunicae bruin, hard of membraanagtig, glad of soms min of meer veselrig opgesplits, met vesels aan die top 1—1·5 cm. lank, en basale vesels korter in kort parallelle rye. *Stingel* baie kort, verberg deur die blaarbasisse. *Blare* 1—3 of soms meer, grondstandig, nagenoeg regop of effens gebuig, 15—45 cm. lank, 1—2 mm. in deursnee, 4-ribbig met 'n sterk aar in elke rib, met basale skedes tot 4 mm. breed. *Blomsteel* 6—13 cm. lank, regop. *Skutblaar en skurblaarjie* lansetvormig, ongeveer 2 cm. lank, groen, reikend tot bo die middel van die blomdek, met sterk are en met baie smal wit vliesige rande wat soms skaars sigbaar is, skerp tot nagenoeg skerp. *Blomme* 1—2, 2·5—3·5 cm. lank. *Blomdekbuis* 6—7 mm. lank, smal aan die basis; *lobbe* 16—25 mm. lank, 6—7 mm. breed, omgekeerd lansetvormig, skerp tot stomp, pers of wit, met 'n geel keel. *Meeldrade* omtrent 12 mm. lank, bo die middel van die blomdek reikend, met helmknoppe en helmdrade ongeveer ewelank. *Styl* 15—17 mm. lank, met stempels gewoonlik bo die meeldraadtoppe reikend.

O.V.S. Van Reenenspas, klipperige grasplekke, alt. 6000 vt., Feb. 1908, *Thode*, STE. 3916.

NATAL. Altemooi, klipperige plekke op plato, alt. 6500 vt., Des. 1920, *Thode*, STE. 3924 (*tipe*), 3923, 3918. Tweekloof, Altemooi, Des.—Jan. 1926—27, *Thode* A1186, in PRE. en K.

Blomtyd sover bekend Des. tot Jan. Hierdie subspecies kom, net soos die tipiese *R. thodei*, in die Drakensberge tussen die O.V.S. en Natal voor, maar is op laer plekke aangetref. Die plante en al die plantdele is groter as die tipiese *R. thodei*, en die style is ook proporsioneel langer sodat die stempels bo die toppe van die meeldrade staan. Die tipiese *R. thodei* is waarskynlik 'n kleiner alpynse vorm.

R. thodei behoort aan die *rosea*-groep wat algemeen in die Westelike Provinsie is. Van *R. rosea* Eckl. verskil dit in die groener skutblare en skutblaartjies, beide met sterker are, en in die bou van die knol. (Baker het in die Flora Capensis die eksemplaar Evans no. 373 van Mt. Erskine, Natal, onder *R. rosea* geplaas. Ondersoek van hierdie eksemplaar in die Kew-herbarium het egter getoon dat dit die tipiese klein *R. thodei* is.)

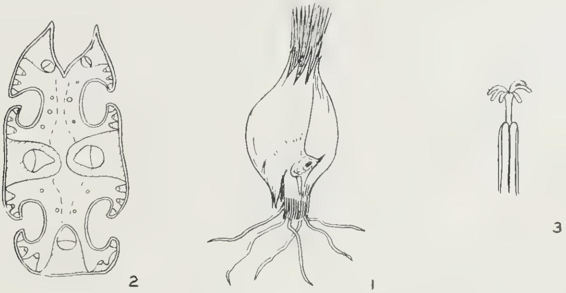

FIG. 3. *Romulea thodei* subsp. *gigantea*. 1, knol, natuurlike grootte; 2, dwarssnee deur blaar, × 20; 3, stempels en toppe van meeldrade, × 1·5.

Dit is naverwant aan *R. autumnalis* L. Bolus van die Oostelike Provinsie en aan *R. campanuloides* Harms van die berge van Suid-Rhodesië en Kenia, wat beide ook aan die *rosea*-groep behoort. Van e.g. verskil dit in die groener skutblaartjies met smaller vliesige rande, in die meeldrade en style wat hoër op teen die blomdek reik, en in die knolle waarvan die tunicae soms veselrig opsplits. Van *R. campanuloides* verskil die subspecies *gigantea* daarin dat die plante en al die plantorgane groter is, en die style tot bo die meeldraadtoppe reik. *R. campanuloides* lyk soveel op die tipiese *R. thodei* dat nadere ondersoek hulle miskien as dieselfde species sal aanwys.

Afkortings wat gebruik is om die verskillende herbaria aan te dui, is volgens die Index Herbariorum (1954) van die I.A.P.T.

Vir die leen van plantmateriaal is dank verskuldig aan die Kurator van die Bolus-herbarium, Universiteit van Kaapstad waar die meeste van die materiaal hier beskryf bewaar word, asook aan die Kurators van van die ander genoemde herbaria.

THE SOUTH AFRICAN SPECIES OF *AIZOACEAE*.

II. TETRAGONIA.

By R. S. Adamson.

The genus *Tetragonia* is a distinctive one in the family on account of the inferior ovary with a single pendulous ovule in each chamber, and the complete absence of staminodal structures. It has often been associated with *Mesembryanthemum* but the relationships are by no means close. It seems best treated as the sole representative of a tribe in the family. (K. Müll. Bot. Jahrb. 42. Beibl. 47. 94. 1908.)

The last complete treatment of the South African species was that by Fenzl in 1862 when he wrote up the genus for *Flora Capensis*. At that time he recognised 23 species. Since then a number have been described principally from Namaqualand and South West Africa. In the absence of a revision there has been a good deal of confusion in collections. In this account which deals only with the species occurring in southern Africa and chiefly with those in the Union of South Africa, not all the described species have been upheld. In all 37 species are recognised of which one is not native and one incompletely known. Six species and six varieties are described for the first time.

The specimens upon which Fenzl based his account and which were housed in Vienna were destroyed during the war 1939-45. This has entailed the selection of lectotypes for a number of his species.

In the course of this revision fresh material has been examined where ever possible. This has been supplemented by the study of dried specimens in the author's own collection and in the following herbaria:—

Bolus Herb., Cape Town	BOL
S. African Mus., Cape Town	SAM
University of Cape Town	CT
Nat. Bot. Gds., Kirstenbosch	NBG
Nat. Herb., Pretoria	PRE
Albany Mus., Grahamstown	GRA
Royal Bot. Gds., Kew	K
British Mus. (Nat. Hist.), London	BM
Naturhist. Riksmus., Stockholm	S

In addition the specimens in the Linnaean herbarium in London have been examined. To the directors, curators and staff of these institutions thanks are returned for the facilities afforded for the examination of specimens or for the loan of specimens for study.

TETRAGONIA.

L. Sp. Pl. 480. 1753. (Gen. Pl. ed. 5. 215. 1754).

Shrublets or herbs, perennial or sometimes annual. *Leaves* alternate, exstipulate, entire, usually somewhat succulent and very commonly with papulose water-storage cells on the surface. *Flowers* axillary or terminal, solitary or more often in cymose groups, sometimes umbellate. Flowers bisexual, male, and transitional on the same plant. *Perianth* segments 3—5 or more, most commonly 4, often coloured internally. *Stamens* few or many, sometimes in fascicles. *Ovary* inferior, 1—8-chambered (1—5 in the S. Afr. species), each chamber with one pendulous ovule: styles free, as many as the chambers in the ovary, rarely more numerous. *Fruit* dry, indehiscent, often winged, ridged or horned.

The type species is *T. fruticosa* L.

A genus found chiefly in the southern hemisphere. The greatest number of species occurs in southern Africa, but there are a number in S. America especially on the west coast, in Australia, New Zealand and Polynesia. A small number of species occur in N. Africa and in S.E. Asia.

In S. Africa the species are especially characteristic of the drier parts of the coastal belt. Some are true coastal species, a few are found in the karroo inland. None are mountain plants.

For discrimination of the species features of habit, leaf, flower, and fruit have been made use of. Of these fruit structure has been found to be the most reliable. Indeed in several cases determination of the species cannot be made with any certainty in the absence of ripe fruit. It may be emphasised that the distinctive features of the fruit are often rendered obscure in pressed dried material though quite evident in the living state.

In Flora Capensis Fenzl utilised the number of styles as a diagnostic feature. This has been found to be unreliable unless care is exercised to compare really similar bisexual flowers. The transitional flowers in all those species with more than one carpel have a reduced number and often only one. In this account where style number is made use of fully developed bisexual flowers are intended.

The genus has been variously sub-divided. Fenzl (Fl. Cap.) made two subgenera. Others have made three either as subgenera or as sections (e.g. Post & Kuntze Lex. Gen. Phan. 584. 1904). Pax & Hoffmann Engl. & Prantl Nat. Pflanzf. ed. 2. 16. c. 232-3. 1934 treat Fenzl's subgenera as sections and add a third by reducing the genus *Anisostigma* Schinz. In this account four subgenera are recognised, the two proposed by Fenzl, and the reduction to subgeneric rank of *Anisostigma* Schinz and of *Tribulocarpus* S. Moore.

KEY TO THE SUBGENERA.

1. Fruit simple, free from the bracts.
    2. Fruit 1—8-chambered: styles as many as the chambers of the fruit: perianth segments free or nearly so.
        3. Stamens more than twice as many as the perianth segments: ovary wholly inferior .. .. 1. *Tetragonia*
        3. Stamens twice as many as the perianth segments or fewer: ovary bulging above the insertion of the perianth 2. *Tetragonoides*
    2. Fruit 1-chambered, 3-winged: styles 4, unequal: perianth with a tube .. .. 3. *Anisostigma*
1. Fruit compound, fused to spinous bracts: perianth of bisexual flowers with a long tube.. .. .. 4. *Tribulocarpus*

Of these subgenera all but *Tetragonoides* are confined to southern Africa.

Sub-gen. 1. **TETRAGONIA.**

Tetragonocarpus Reichb. Consp. 166. 1828: Fenzl Fl. Cap. 2. 466 1859.

Shrublets or perennial herbs. *Flowers* pedicellate or less often sessile. *Perianth* segments usually 4. *Stamens* more than twice as many as the perianth segments, sometimes in bunches alternating with the perianth segments, but more commonly irregularly arranged. *Ovary* wholly inferior. *Fruit* dry, commonly 4-winged.

As this subgenus contains the type species, *T. fruticosa* L., it carries the generic name in accordance with Art. 32 of the International Rules (Code Bot. Nom. 1952).

The subgenus is confined to southern Africa and has its greatest concentration of species on the western coastal belt between Angola and the Cape. It also extends along the southern coastal strip to the S.E. Cape. There are also species in the arid region of the karroo but none which extend into the real summer rainfall area.

Fenzl (l.c.) sub-divided this subgenus into two sections, *Pterigonia* in which the fruit has 3 or 4 wings, and *Haplogonia* in which the fruit is wingless. This scheme has not been upheld as examination of a quantity of material has revealed that there are species with wingless fruit in which all other features are clearly to be associated with his section *Pterigonia*.

Here the subgenus is sub-divided into a number of series. These agree to a large extent with those established by Fenzl though some of those have been sub-divided and his Section *Haplogonia* is reduced to a series.

KEY TO THE SERIES.

1. Stems woody, at least at the base.
    2. Fruit winged.
        3. Wings of the fruit thin, smooth or if papulose the stem erect and woody.

4. Leaves not succulent.
5. Glabrous or papulose: stems woody, with lax branching . . . . 1. *Fruticosae*
5. Hairy: Stems woody at the base only: flowers large . . . . 5. *Macranthae*
4. Leaves succulent: stems short with many branches: compact shrublets . . . . 2. *Robustae*
3. Wings of the ripe fruit papulose, rather rigid: stems stout, woody at the base only . . . . 4. *Decumbentes*
2. Fruit not winged, smooth or ridged . . . . . . 3. *Salignae*
1. Stems quite herbaceous.
6. Flowers pedicellate: often tuberous . . . . . . 6. *Pedunculares*
6. Flowers sessile or nearly so: mostly annuals . . . . 7. *Chenopodinae*

Ser. 1. **Fruticosae.** Fenzl Fl. Cap. 2. 461. 1862 (emend.).

Erect or semi-erect shrublets with lax branching. *Leaves* usually not succulent. *Flowers* pedicellate, axillary, solitary or in groups. *Fruit* winged.

The type species is *T. fruticosa* L.

KEY TO THE SPECIES.

1. Flowers in groups of 2—4, rarely some solitary.
2. Leaves lanceolate or ovate-lanceolate, narrowed to the base.
3. Leaves sessile, papulose, usually revolute: fruit over 1·5 cm. long, with an obtuse tubercle or ridge between the wings . . . . *fruticosa*
3. Leaves petiolate.
4. Leaves glaucous, rather thick, revolute: styles 2—3: fruit cuneate at the base, with a distinct ridge between the wings . . . . *glauca*
4. Leaves green, usually flat: styles 4: fruit rounded at the base, with no ridge between the wings . . . . *virgata*
2. Leaves ovate or oblong, usually widest at the base, petiolate.
5. Leaves thick, papulose, folded over on the midrib . . *reduplicata*
5. Leaves flat or revolute, not folded.
6. Leaves smooth or very finely papulose, flat, rather thin.
7. Flowers axillary: leaves not over 1·5 cm. long . . *arbuscula*
7. Flowers all or most in a leafless inflorescence: leaves large . . . . *spicata*
6. Leaves coarsely papulose, rather thick.
8. Leaves acuminate or mucronate: fruit smooth . . *arbusculoides*
8. Leaves obtuse: fruit papulose . . . . . . *Rangeana*
1. Flowers solitary, on long pedicels.
9. Slender, sprawling: leaves ovate or oblong, thin, abruptly narrowed to the petiole . . . . *spicata* var. *laxa*
9. Stout, erect: leaves oblong-lanceolate, narrowed to a short petiole.
10. Leaves glaucous: flowers in a leafless inflorescence: fruit with no ridge between the wings . . . . . . *calycina*
10. Leaves green: flowers all axillary: fruit with a ridge between the rigid wings . . . . *macroptera*

1. **T. fruticosa** L. Sp. Pl. 480. 1753. *T. linearis* Haw. Rev. Pl. Succ. 73. 1821.

Prostrate or sprawling, yellowish-green or tinged with red, papulose-hairy. *Stems* woody, up to 2 m. long, usually with many erect or semi-erect branches, the younger with decurrent ridges, the older glabrescent. *Leaves* lanceolate, oblanceolate or oblong, 1—4·5 cm. long, 0·2—1 cm. wide, flat or more commonly revolute or rolled, obtuse at the tip, narrowed to the base but not petiolate, distinctly papulose below, less so above, the midrib projecting on the underside. *Flowers* in the uppermost axils, often crowded, in groups of 2—5, commonly 3, the subtending leaves small or wanting and the inflorescence apparently spicate. Flowers bisexual, male and transitional. Pedicels spreading, papulose, 0·4—1·5 cm. long, elongating at the fruiting stage. *Perianth* yellowish or tinged with red, densely papulose outside: segments 3—4 mm. long and about as wide, two obtusely pointed and two obtuse with membranous tips. *Stamens* numerous: anthers elongate-oblong. *Styles* most commonly 3—4, but 1—2 in transitional flowers. *Fruit* 4-winged, 0·8—2·5 cm. long, 1—3 cm. wide, rounded at the base but shortly cuneate at the pedicel, flat or emarginate at the top: wings papulose when young but later smooth: a distinct tubercle or small ridge on the upper half between the wings. Fruit at length black.

The type is in herb. Linn. (648 : 1).

On sand or among rocks, most common near the sea but occurring inland. Variable in size, habit, colour and leaf-shape in relation to habitat. Coastal forms have tightly rolled apparently linear leaves, forms growing shade have quite flat leaves and much elongated stems. There are all stages of intermediate. The varieties described by Fenzl (Fl. Cap. 2. 466. 1862), a. *lanceolata* and b. *linearis* are merely habitat states. In collections much confused with *T. spicata* but distinguished by the not petiolate leaves, crowded flowers, obtuse perianth and large fruit. Broad-leaved forms have been confused with *T. decumbens*.

NAMAQUALAND. Hondeklip Bay, *Pillans* (BOL): Kamiesberg, *Adamson* 5038.

VAN RHYNSDORP. Nieuwerust, *Marloth* 8228 (PRE): Van Rhynsdorp, *Johnson* 192 (NBG): Klaver, *Adamson* 4971: Ebenezer, *Drege* (S).

CLANWILLIAM. Zout Riv., *Schlechter* 8122 (BM, BOL, GRA, K, PRE, S): Olifants Riv., *Drege* (S): Swartboschkraal, *Schlechter* 5172 (BOL, GRA).

PIKETBERG. Witvlei, *Van Breda* 200 (BOL, PRE): Sauer, *Wilman* 745, 899 (BOL).

HOPEFIELD. Saldanha Bay, *Drege* (S): *Galpin* 11498 (K, PRE): *Zeyher* (S): Langebaan, *Acocks* 15219 (K, PRE): Hopefield, *Bolus* 12697 (BOL): Darling, *Gillett* 3104 (BOL): Mamre ,*Bolus* 3841 (BOL): *Marloth* 6617 (PRE).

CAPE. Dassen Is., *Maguire* (NBG): *Marloth* 6692 (PRE): *Pole-Evans* 1 (PRE), s.n. (BOL): Robben Is., *Walgate* 485, 632 (NBG): Melkbosch Strand, *Adamson* 4671-2, 4674: *Compton* 9330 (NBG): Riet Valley, *Ecklon* (62.11) (S): Cape Flats, *Hafstrom & Acock* (S): *Zeyher* 2124 (S), 2630 (S): Milnerton, *Lindeberg* (S): *Zeyher* (SAM): Salt River, *Burchell* 687 (K): Cape Town, *Bolus* 3841 (BOL, K): *Hafstrom & Acock* (S): *Rogers* 1056 (GRA): *Zeyher* 2630 (SAM): Camps Bay, *Burchell* 319 (K): *Galpin* 4070 (GRA, PRE): *Garside* 615 (K): *MacOwan* 1876 (BM): *Prior* (K): Bakoven, *Adamson* 962: *Hafstrom* (S): Hout Bay, *Acocks* 675 (PRE): *Fairall* 175 (NBG): *Wall* 1207/7 (S), s.n. (S): Lion's Head, *Ecklon* 789 (BOL): *MacOwan* 1876 (SAM): *Wolley-Dod* 3675 (BOL): Karbonkelberg, *Compton* 9867 (NBG): Ronde Vlei, *Compton* 9838 (NBG): Princess Vlei, *Adamson* 2183 (CT): Muizenberg, *O. Kuntze* (K): *Moss* 17926 (BM): *Robertson* (BM): *Wall* 656/51 (S): *Wolley-Dod* 958 (BM, K): Kalk Bay, *Bolus* 3841 (BM, K): *Moss* 3272 (BM): *Wall* (S): *Zeyher* 14 (SAM): Silvermine Valley, *Andreae* 95 (PRE): Fishhoek, *Ecklon* 789 (S): *Hafstrom* (S): Simonstown, *Fair* (BOL): *MacGillivray* 145, 597 (K): *Salter* 270/12 (BM): *Wright* (K): Kommetjie, *Marloth* 1595 (PRE): Witsands, *Penfold* 230 (NBG): Patrys Vlei, *Wall* 1049 (S): Hesters Dam, *Adamson* 1154: Platboom, *Compton* 12301 (NBG): Cape Point, *E. P. Phillips* (PRE): *Wall* 1207/7 (S): 1746/41 (S).

STELLENBOSCH. Stellenbosch, *Ecklon & Zeyher* 2124 (GRA): Strand, *Parker* 3532 (BOL, NBG).

CALEDON. Kogel Bay, *Hafstrom* (S): Hangklip, *Adamson* 4700, 4702-3: Mossel River, *Compton* 23662 (NBG): Stanford, *Bond* 761 (NBG).

BREDASDORP. Brandfontein, *Esterhuysen* 18983 (BOL).

WORCESTER. Worcester, *Thorne* (SAM): *Van Breda* 128 (PRE).

LAINGSBURG. Whitehill, *Archer* (BOL): *Compton* 2899 (BOL), 10879, 10897 (NBG).

ROBERTSON. Robertson, *Melle* (BOL).

MONTAGU. Kogmans Kloof, *Michell* 6 (PRE).

LADISMITH. Van Wyksdorp, *Adamson* 5166.

WILLOWMORE. Willowmore, *Pole-Evans* 19 (PRE).

STEYTLERVILLE. Wolvefontein, *Acocks* 16003 (K, S, PRE).

OUDTSHOORN. Oudtshoorn, *Britten* 55 (GRA): *Rogers* 4269a (BOL).

RIVERSDALE. Albertinia, *Muir* 2644 (PRE): Still Bay, *Muir* 5098 (PRE).

MOSSEL BAY. Mosel Bay, *Rogers* 4244 (BOL, GRA).

GEORGE. Wilderness, *Compton* 14326, 23066 (NBG).

KNYSNA. Sedgefield, *Adamson* 5281: Belvedere, *Rehmann* 414 (BM): Knysna, *J. Phillips* 9 (GRA): Heads, *Williamson* 15 (GRA): Lagoon Is., *Williamson* 70 (GRA): Noetzie, *Keet* 651 (GRA): Robberg, *H. C. Taylor*

(PRE): Buffalo Bay, *Keet* 5 (PRE): Ratelbosch, *Fourcade* 85 (BOL, GRA): Plettenburg Bay, *Codd* 3555 (PRE): Keurbooms River, *Codd* 3575 (PRE): *Fourcade* 630, 1057, 1067 (BOL): *Morris* 434 (NBG).

HUMANSDORP. Humansdorp, *Fourcade* 1064 (SAM): Gamtoos River, *Fourcade* 5752 (BOL).

UITENHAGE. Uitenhage, *Bowie* (BM): *Zeyher* (SAM): Swartkops River, *Ecklon* (S): *Ecklon & Zeyher* 2124 (BOL): *Pocock* 21 (GRA).

PORT ELIZABETH. Port Elizabeth, *Drege* (S): *J. L. Drege* 302 (GRA): *Ecklon* (S): *Forbes* (K): *Potts* 309 (BOL, GRA): Humewood, *Dyer* 617 (GRA): *Cruden* 480 (GRA): *Long* 456 (K), 797 (GRA, K, PRE): Redhouse, *Paterson* 65a (BOL, GRA), s.n. (GRA): Barkens River, *Cruden* 402 (GRA): *J. L. Drege* 344 (GRA).

GRAAFF-REINET. Graaff-Reinet, *Bolus* 1870 (BOL, S).

ALEXANDRIA. Sundays River, *Osbeck & Sparmann* (S): *Zeyher* 2628a (S, SAM), s.n. (SAM).

ALBANY. Cradock Road, *Dyer* 1579 (PRE): Belmont Valley, *Adamson* 5254.

BATHURST. Port Alfred, *Adamson* 5256-8: *Galpin* 2968 (GRA, PRE).

Without locality:—*Burchell* s.n. (K): *Drege* 7045a (BM, K): *Harvey* 493 (BM, K): *Masson* (BM): *Oldenburg* 673 (BM): *Swartz* (S): *Thunberg* (S): *Wallich* (K).

Cultivated:—*Anderssen* (S): *Grey* (K).

2. **T. spicata** L.f. Supp. Pl. 258. 1781.

Green or purplish. Rather variable in habit, erect or sprawling. *Stems* woody at least at the base, much branched, up to 1 m. long, the branches often divaricate. Young stems papulose-hirsute, the older glabrescent, pale-coloured, terete or with very faint decurrent ridges. *Leaves* petiolate, rather variable in shape and size, oblong, ovate, almost deltoid or almost lanceolate, usually widest near the base, 1—4 cm. long, 0·4—2 cm. wide, flat or less often revolute at the edges, obtuse at the tip, at the base rather abruptly narrowed to the petiole: petiole 0·2—1 cm. long. *Flowers* in groups of 2—5, rarely solitary, the lower axillary, the upper in a more or less leafless terminal inflorescence, usually rather crowded. Pedicels hairy-papulose, 0·3—0·8 cm. long. Male and bisexual flowers associated. *Perianth* papulose-hirsute, the segments oblong-ovate, more or less acute, 2—2·5 mm. long. *Stamens* 12—15: anthers bright yellow, linear-oblong. *Styles* 1—3, dark coloured, longer than the stamens but shorter than the perianth. *Fruit* 4-winged, 0·7—1 cm. long, 0·4—0·7 cm. wide, more or less cuneate at the base, flat or indented at the top, smooth or faintly papulose, with a distinct tubercle or ridge between the wings.

The type is in herb. Thunberg, Uppsala.

At low altitudes in a variety of habitats.

Though variable in habit, size and leaf, the species is readily known by the flat petiolate leaves, terminal leafless inflorescence, and small fruit with distinct secondary ridge. The flowering stems are herbaceous. The varieties described by Fenzl in Fl. Cap. 2. 465. 1862 a. *latifolia* and b. *angustifolia*, cannot be upheld. Both may be found on the same bush.

S.W.A. Buchuberg, *Dinter* 6530 (BOL).

NAMAQUALAND. O'okiep, *Bolus* 9534 (BOL): *Dümmer* (K): *Scully* 58 (BM, BOL): Spektakel, *Esterhuysen* 5738 (BOL): Springbok, *Leipoldt* 4021 (BOL): Kamieskroon, *Thorne* (SAM): Garies, *Acocks* 14949 (K, PRE), 14966 (PRE): *Leipoldt* 4021 (BOL): *Thorne* (SAM): Brakdam, *Esterhuysen* 5079 (BOL).

VAN RHYNSDORP. Van Rhynsdorp, *Compton* 20856 (BOL): Giftberg, *Compton* 20856 (NBG).

CALVINIA. Loeriesfontein, *Lavis* (BOL).

HAY. Windhoek, *Acock* 2350 (BOL): Roodebloom, *Pappe* (SAM).

CLANWILLIAM. Road to Klaver, *Adamson* 4527, 4530, 4966: Clanwilliam, *Compton* 10975 (NBG): *Henrici* 3470 (PRE): *Leipoldt* 365 (PRE): Barrage, *Adamson* 4692: Olifants River, *Adamson* 4492.

PIKETBERG. Het Kruis, *Stephens & Glover* 8718 (BOL, K), 8721 (BOL, K): Piketberg, *Adamson* 4475-6: *Compton* 6884 (NBG): *Guthrie* 1209, 2610 (NBG): *Steyn* 541 (NBG).

TULBAGH. Steendal, *Pappe* (SAM): Nieuwkloof, *Compton* 11692 (NBG).

WORCESTER. Hex River, *Esterhuysen* 21585 (BOL): *Lamb* (SAM): Karroo Gdn., *Barker* 5924 (NBG).

SUTHERLAND. Sutherland, *Theron* 1297 (K, PRE).

LAINGSBURG. Whitehill, *Compton* 14910 (NBG).

PAARL. Paarlberg, *Drege* (S).

STELLENBOSCH. Stellenbosch, *Prior* (K, PRE): Eerste River, *Garside* 104 (K): Stickland, *Acock* 785 (S).

HOPEFIELD. Saldanha Bay, *Ecklon & Zeyher* 2122 (GRA, S, SAM p. pte): Hopefield, *Letty* 78 (PRE): *Schlechter* 5326 (BOL): Darling, *Adamson* 4947: *Bolus* 12696 (BOL): *Compton* 19886 (NBG): Mamre, *Bolus* 107 (BM): *Compton* 11614 (NBG).

MALMESBURY. Malmesbury, *Barker* 4669 (NBG): Abbotsdale, *Adamson* 4935-7: Kalabas Kraal, *Hutchinson* 196 (K, PRE): "Swartland" *Zeyher* (S).

CAPE. Melkbosch Strand, *Adamson* 4676: Philadelphia, *Wasserfall* 938 (PRE): Koeberg, *Wasserfall* 938 (K): Vissershoek, *Compton* 13445 (NBG): *Henderson* 1144 (NBG): Tygerberg, *Pillans* (BOL): Bellville

Wall (S): Elsies River, *Acock* 935 (S): Observatory, *Adamson* 2584 (CT): Rondebosch, *Ecklon* (S).

SWELLENDAM. Buffelsjaagts, *Zeyher* 2628 (S, SAM), 2628b (SAM): Slang River, *Adamson* 4610: *Walgate* 847 (PRE): Bonnievale, *Compton* 3460 (BOL).

RIVERSDALE. Gouritz River, *Story* 2883 (PRE).

MONTAGU. Montagu Baths, *Page* 57 (PRE).

LADISMITH. Roodeberg, *Barker* 5492 (BOL, NBG).

BEAUFORT WEST. Nieuwveld Mts., *Marloth* 2121 (PRE).

GRAAFF-REINET. Graaff-Reinet, *Bolus* 107 (GRA): 100 (GRA).

PRINCE ALBERT. Prince Albert, *Bolus* 107 (BOL, S, p. pte.), 11513 (BOL, GRA, PRE).

GEORGE. George, *Fourcade* 4737 (BOL).

UITENHAGE. Uitenhage, *Ecklon* (S): *Zeyher* (SAM): Swartkops River, *Ecklon & Zeyher* 2121 (GRA, S): *Zeyher* 138 (BM, K, SAM), s.n. (S), 2629 (K, PRE, S).

PORT ELIZABETH. Redhouse, *Fries, Norlindh & Weimark* 550 (BOL): Perseverance, *Paterson* 65a (PRE): Despatch, *J. L. Drege* 57 (GRA).

ALBANY. Howiesons Poort, *Hutton* (S): Fish River, *MacOwan* 9786 (BOL).

SOMERSET EAST. Somerset East, *Bowker* (K): *J. L. Drege* 452 (GRA).

Without locality:—*Drege* 7043 (BM, K, PRE, S), 7046 (K), s.n. (S): "Hort. Kew" (BM): *Masson* (BM): *Payne* (S): *Pappe* (K): *Prior* (K): *Thunberg* (S).

Var. **laxa** Adamson var. nov.

A typo differt caulibus tenuibus, floribus solitariis vel umbellatis longe pedicellatis subdistantibus.

Much more slender, sprawling or semi-scandent. *Flowers* solitary or umbellate, the common pedicel bearing 2—4 flowers. Pedicels slender 0·5—1·5 cm. long, densely papulose. Flowers distant, the lower axillary, the upper without bracts. Styles 3—4.

The type is *Adamson* 4630 (BOL).

Among bushes on koppies in the Little Karroo.

LADISMITH. South of Ladismith, *Adamson* 4630, 4641, 4643.

LAINGSBURG. Whitehill, *Compton* 15183 (NBG).

NAMAQUALAND. Spektakel, *Compton* 11462 (K, NBG).

3. **T. arbuscula** Fenzl in Fl. Cap. 2. 467. 1862.

A woody shrublet up to 40 cm. high, usually erect, with ascending branches. *Stems* pale-coloured, smooth, with raised decurrent lines from the leave bases. *Leaves* petiolate, rather small especially the upper, either lanceolate or linear-lanceolate, 0·5—1·2 cm. long and 0·1—0·3 cm. wide, or ovate, oblong or almost rotund, 0·5—1·5 cm. long and 0·3—0·7 cm. wide, obtuse at the tip, at the base rounded and abruptly narrowed to the petiole: petiole 0·2—0·3 cm. long. *Flowers* all axillary, either solitary or more commonly in groups of 2—3, on slender pedicels as long as or longer than the subtending leaves. *Perianth* segments broadly ovate, acute, bright yellow inside. *Stamens* many: anthers oblong, bright yellow. *Styles* usually 3, less often 1, 4 or 5. *Fruit* pendulous, 0·6—1·5 cm. long and wide, rounded at the base, cordate-indented at the top: Wings thin, smooth, with no intermediate ridge or swelling.

The lectotype is *Drege* s.n. in herb. Sonder. S.

Among rocks or bushes in the karroo area.

This has been much confused with *T. spicata.* It is distinguished by the more woody habit, smaller leaves, strictly axillary flowers, less elongated anthers, and pendulous fruit as wide as long and without ridges between the wings. Fenzl (l.c.) described two varieties, a. *linearis* and b. *latifolia*, but while extreme forms look distinct they are connected by a complete series of intermediates. Narrow leaved forms are more abundant in the central and eastern districts. Specimens distributed by Dinter (4922) under the name *T. karasmontana* are this species.

S.W.A. Windhoek, *Codd* 5788 (PRE): Bulshoek, *Liebenberg* 5119 (PRE): Aus. *Dinter* 6092 (BM. K. S): Hoffmansveld, *Pearson* 9525 (BOL): Schakalskuppe, *Pearson* 4251 (K), 4314 (K), 4490 (GRA, K), 4772 (GRA, PRE), 4775 (BM, BOL, K): Swakopmund, *Bradfield* 483 (K, PRE): Keiap River. *Pearson* 8672 (BM, BOL, K): Choaberit, *Pearson* 9457 (K): Klein Karas, *Dinter* (PRE): 4922 (BOL. K): Damaraland, *Wahlberg* (S).

GORDONIA. Upington, *Glover* (BOL).

KENHARDT. Kakamas. *Acocks* 16363 (K. PRE): Kenhardt, *Lewis* (SAM): Houmoed, *Acocks* 15074 (K, PRE).

CALVINIA. Ekerdam, *L. E. Taylor* 2702 (NBG).

HAY. Floradale, *Esterhuysen* 2322 (BOL, NBG, PRE): Windhoek, *Acocks* 2358 (BOL): Honeynest Kloof, *Wilman* (BOL).

HERBERT. Douglas, *Orpen* (SAM): Ramal, *Wilman* (SAM): *Kotze* 79 (PRE).

BARKLY WEST. Pniel, *Acocks* 1575 (K, PRE), 4123 (BOL): Delpoorts Hope, *Acocks* 1660 (BOL, PRE), 1661 (K, PRE), 4124 (BOL): Caerwinning, *Paton* (SAM).

PRIESKA. Prieska, *Bryant* 213 (K), 317 (PRE), 1185 (PRE): *Pole-Evans* 2282 (K, PRE).

CARNARVON. Carnarvon, *Acocks* 14360 (PRE).

HOPETOWN. Hopetown, *Muskett* 2049 (BOL): *Schweickerdt* 1182 (PRE): Breede River, *Shaw* (K): Potfontein, *C. A. Smith* 2814 (PRE).

BRITSTOWN. Britstown, *Bryant* 510 (K): *Kotze* 837 (PRE).

VICTORIA WEST. Victoria West, *C. A. Smith* 2395 (K, PRE), 5588 (K).

BEAUFORT WEST. Nelspoort, *Acocks* 15882 (PRE).

MIDDELBURG. Middelburg, *Bennie* 680 (GRA): *H. H. Bolus* (BOL): *Gill* 116 (PRE): Grootfontein, *Selschop* (PRE): *Theron* 128 (PRE): *Verdoorn* 1548 (PRE): Compassberg, *Drege* (S).

COLESBERG. Orange River, *Knobel* (K).

PRINCE ALBERT. Prince Albert, *Bolus* 11913 (BOL).

GRAAFF-REINET. Graaff-Reinet, *Bolus* 107 p. pte. (BOL, K, GRA, S), 844 (K), s.n. (GRA).

CRADOCK. Cradock, *Cooper* 488 (BM, BOL, K): Baroda, *Dyer* 1036a (PRE): Road to Cookhouse, *Story* 11 (PRE): Rietfontein, *Acocks* 11917 (PRE): *Galpin* 5649 (GRA, K, PRE).

TARKA. West of Tarkastadt, *Adamson* 5252.

CLANWILLIAM. Heerenlogement, *Pearson* 9525 (BOL): Bidouw *Leipoldt* 4016 (BOL).

OUDTSHOORN. Gamka River, *Burke* (K).

MOSSEL BAY. Gouritz River, *Zeyher* 712 (BM, S, SAM), s.n. (SAM).

SOMERSET EAST. Somerset East, *Atherstone* (K).

FORT BEAUFORT. Fort Beaufort, *Cooper* 566 (BM, K).

O.F.S. Fauresmith, *Hoffman* (PRE): *C. A. Smith* 3899 (PRE), 3905 (K), 4521 (PRE), 5443, 5447 (PRE), 5594 (K, PRE): *Van Rensburg* (K, PRE): Riet River, *C. A. Smith* 4500 (PRE): Lückhoff, *Henrici* 4366 (PRE): *Sidey* 364 (PRE): *C. A. Smith* 5325 (K, PRE): s.l. *Hutton* (K).

Without locality:—*Atherstone* (K): *Drege* 7040 (BOL, K, PRE), s.n. (S): *Pole-Evans* 2266 (PRE).

4. **T. arbusculoides** Engl. Bot. Jahrb. 48. 503. 1913.

An erect branched shrublet, 30—70 cm. high. *Stems* pale-coloured, with distinct raised decurrent lines, the younger papulose. *Leaves* petiolate, rather thick, coarsely papulose, the blades broad-ovate or rotund, 1—2 cm. long and 0·5—1 cm. wide, flat, revolute or folded, acute, with the tip shortly acuminate or mucronate: petiole 0·2—0·8 cm. long. *Flowers* axillary in groups of 2—3. Pedicels 0·3—0·7 cm. long. Pedicels and perianth coarsely papulose. *Perianth* segments 3—4, connate at the base. *Stamens* 12—15. *Styles* 3. *Fruit* 4-winged, smooth, about 2 cm. long and wide, deeply notched at the top, shortly cuneate at the base, without secondary ridges between the wings.

The type is *Dinter* 200.

River beds in arid parts from Angola through S.W. Africa to the northern parts of the Union.

S.W.A. Aus, *Dinter* 3548 (BM, PRE), 6092 (PRE): Haries, *Pearson* 9525 (K): Luderitz, *Kinges* 2337 (PRE): Swakopmund *Engler* 6041 (K): *Marloth* 5088 (PRE): Swakop River, *Galpin & Pearson* 7505 (PRE): Warmbad, *Galpin* (PRE): *Marloth* 4791 (PRE): Welwitsch, *Galpin & Pearson* 7591 (PRE, SAM): s.l. *Pearson* (SAM).

GORDONIA. Vaalhoek, *Barnard* (SAM).

PRIESKA. Prieska, *Bryant* J.317 (PRE).

KENHARDT. Kakamas, *Acocks* 14276 (PRE): *Wasserfall* 1058 (PRE).

NAMAQUALAND. O'okiep, *Dümmer* (K): Anisfontein, *Pillans* 5314 (BOL, K).

5. **T. reduplicata** Welw. in Oliver Fl. Trop. Afr. 2. 583. 1871.

Shrubby, up to 80 cm. high. *Stems* almost glabrous and smooth. *Leaves* somewhat succulent, papulose, ovate, 1—2 cm. long, 1—1·5 cm. wide, acute, folded on the midrib with the undersides pressed together: petioles 0·3—1 cm. long. *Flowers* in groups of 2—4 in the upper axils. Pedicels about 0·5 cm. long. *Perianth* segments 4, obtuse. *Stamens* 12—20. *Styles* 2—3. *Fruit* winged, 1—1·5 cm. long and wide, smooth, without intermediate ridges between the wings.

The type is *Welwitsch* (Mossamedes) K.

Dry river beds from Angola to the northern part of the Union. Allied to *T. arbusculoides* but taller, much less papulose, and with the characteristic folded leaves.

ANGOLA. Mossamedes, *Gossweiler* 11350 (BM): *Welwitsch* 2379 (BM, K), s.n. (K).

S.W.A. Luderitzbucht, *Hobart-Hampson* (BM): *Moss* 11658 (K): Swakop River, *Galpin & Pearson* 7505 (SAM): Swakopmund, *Moss* 17898 (BM): *Pearson* 583 (SAM): nr. Goodhouse, *Galpin* 14207 (K): s.l. *Pearson* 1743 (SAM).

KENHARDT. 25 miles north of Kenhardt, *Acocks* 14378 (K, PRE).

6. **T. Rangeana** Engl. Bot. Jahrb. 48. 504. 1913.

A coarsely papulose erect shrublet. *Leaves* petiolate, broadly ovate, 2—2·5 cm. long, 1—1·5 cm. wide, papulose: petioles 0·5—0·8 cm. long. *Flowers* in axillary groups on very short pedicels. *Perianth* segments 3, distinctly connate at the base. *Styles* 3. *Fruit* 3 -or 4-winged, coarsely papulose, about 1 cm. long and wide, with prominent intermediate ridges between the wings.

The type is Range 2 in herb. Berlin.

Recognised by the petiolate papulose leaves and the papulose fruit with distinct intermediate ridges. Apparently confined to S.W. Africa.

7. **T. glauca** Fenzl in Fl. Cap. 2. 468. 1862.

An erect or suberect shrublet, up to 50 cm. high, the branches spreading. *Stems* pale-coloured, papulose-hirsute when young but glabrescent, the older ridged. *Leaves* glaucous, papulose, lanceolate or elliptic-lanceolate, 2—2·5 cm. long, 0·4—0·6 cm. wide, acute at the tip, gradually narrowed at the base to a petiole 0·1—0·3 cm. long. Leaves flat or revolute at the edges. *Flowers* in groups of 2—4, in the upper axils, the uppermost part of the inflorescence leafless and with male flowers only. Pedicels slender, 0·4—1 cm. long. *Perianth* thinly papulose: segments oblong, acute. *Stamens* many: anthers linear-oblong. *Styles* 2—3, rarely 4. *Fruit* usually pendulous, 4-winged, 0·5—1·5 cm. long, 0·4—2 cm. wide, distinctly cuneate at the base, notched at the top: wings rigid, with a small intermediate ridge between. Fruit papulose when young, but glabrous and glaucous when mature.

The lectotype is *Drege* 7030 (S).

Dry karroo areas.

Readily known by the habit, glaucous lanceolate leaves gradually narrowed to a short petiole and the rather small fruit cuneate at the base and with intermediate ridges.

S.W.A. Klein Karas, *Ortendal* 258 (PRE).

NAMAQUALAND. Klipfontein, *Compton* 5507 (NBG): Zuurberg, *Pearson* 3274 (K): Matjes River, *Wagener* 168 (PRE): Kamieskroon, *Acocks* 15098 (K, PRE): *Adamson* 5056: Bitterfontein, *Pearson* 5531 (BOL, K).

VAN RHYNSDORP. Klaver, *Adamson* 4967: *Compton* (NBG).

CLANWILLIAM. Clanwilliam, *Bolus* 365 (BOL).

PIKETBERG. Het Kruis, *Stephens & Glover* 8719, 8720 (K).

LADISMITH. Ladismith, *Adamson* 5163-5: Wittepoort, *Compton* 7489 (NBG).

PRINCE ALBERT. Foot of Swartberg, *Wall* s.n. (S), 17 (S).

MOSSEL BAY. Gouritz River, *Ecklon & Zeyher* 99.12 (S), 2123 (S, SAM).

Without locality:—*Drege* 7030 (S), 7070 (BM, K), s.n. (S).

8. **T. virgata** Schltr. Bot. Jahrb. 27. 125. 1900.

An erect or sprawling shrublet up to 50 cm. high. *Stems* woody, smooth, the younger pale-coloured, ridged when dry. *Leaves* green, somewhat papulose, ascending, lanceolate, elliptical or ovate-lanceolate, 2—4 cm. long, 0·3—0·7 cm. wide, flat but revolute when dry, gradually narrowed at the base to a very short petiole. Leaves close on the young parts but separated on the older. Inflorescence leafless at the top but the lower flowers axillary. *Flowers* mostly in pairs, one male and one bisexual, occasionally in threes. Pedicels slender, 0·5—1 cm. long, but extending at the fruiting stage. *Perianth* segments 4, papulose outside, broadly ovate, sometimes partly revolute. *Stamens* many, the filaments short, the anthers pale yellow, oblong. *Styles* 4, less often 3, slightly longer than the stamens. *Fruit* winged, often pendulous, 0·9—3 cm. long and wide, smooth, deeply indented at the top, the wings with a thickened border. Intermediate ridges wanting or obscure.

The type is *Schlechter* 8255 in herb. Berlin, cotype in BOL.

Dry places at low altitudes in the N.W. Cape.

Distinguished by the narrow very shortly petiolate leaves, flowers on long pedicels, 4 styles, and large smooth fruit.

GORDONIA. 49 miles from Upington, *Pole-Evans* 2134 (PRE).

CALVINIA. Lokerberg, *Acocks* 17323 (PRE).

NAMAQUALAND. Kamieskroon, *Adamson* 5050: Brakdam, *Esterhuysen* 5679 (BOL): Wallekraal, *Adamson* 5011, 5018, 5024: Ratel Poort, *Compton* 20611 (NBG).

VAN RHYNSDORP. Kareeberg, *Schlechter* 8255 (BM, BOL, GRA, K, PRE, S): Knechtsvlakte, *Compton* 20863 (NBG).

CLANWILLIAM. Clanwilliam, *Bond* 1073 (NBG): Elands Bay, *Zinn* (SAM).

9. **T. calycina** Fenzl in Fl. Cap. 2. 467. 1862.

Woody, more or less erect, up to 50 cm. high. Young *stems* papulose, with decurrent ridges, the older terete, pale-coloured, almost smooth. *Leaves* lanceolate, 2—2·5 cm. long, 0·2—0·6 cm. wide, flat, folded or slightly revolute, papulose especially below, narrowed at the base to a petiole 0·2—0·4 cm. long. *Flowers* pedicellate, solitary, in a leafless often secund terminal inflorescence. Pedicels slender, 1—2 cm. long, elongating at the fruiting stage. *Perianth* papulose, the segments 4, 2—3 mm. long, oblong, acute. *Stamens* about 15: anthers linear-oblong, about as long as the filaments. *Styles* 2—3, occasionally 4, very slightly longer than the stamens. *Fruit* large, 1·6—2·5 cm. long and wide, 4-winged, notched at the top, rounded or rather abruptly narrowed at the base: wings firm, with reticulate veins and distinct intermediate ridges.

The type is *Drege* 7059 in herb. Vienna: lectotype *Drege* s.n. (S).

Generally among rocks in the dry N.W. coastal strip.

S.W.A. Osona, *Dinter* 379 (BM, GRA).

NAMAQUALAND. Garies, *Adamson* 5001: s.l. *Drege* (S).

VAN RHYNSDORP. Klaver, *Andreae* 462 (PRE).

CLANWILLIAM. Brakdam, *Johnson* 199 (NBG).

10. **T. macroptera** Pax Bot. Jahrb. 10. 11. 1889.

An erect or sprawling shrublet up to 60 cm. high, with elongated ascending branches. *Stems* papulose when young but glabrescent, pale-coloured, ridged when dry. *Leaves* firm, flat or folded, often revolute in the older stages, oblong, 1·5—3 cm. long, 0·4—0·6 cm. wide, rounded at the tip, narrowed at the base to a short petiole. *Flowers* solitary in the upper axils. Pedicels 0·5—1·5 cm. long. *Perianth* very papulose, the segments ovate-triangular, subacute. *Stamens* many: anthers oblong. *Styles* 2—3. *Fruit* rigid, 1·5—2 cm. long, smooth, rounded at the base, flat or slightly emarginate at the top, with distinct ridges in the upper half between the wings.

The type is *Marloth* 1427 in herb. Berlin, lectotype in BOL.

Known by the solitary flowers and fruit with rigid wings and ridges between.

S.W.A. Karibib, *Marloth* 1427 (BOL, PRE, SAM): Windhoek, *Moss* 17980 (BM): Gobabis, *Liebenberg* 4529 (PRE): Damaraland, *Een* (BM). Klein Karasberg, *Ortendal* 171 (K, S), 258 (PRE, S).

NAMAQUALAND. Bitterfontein, *Adamson* 4992-3.

VAN RHYNSDORP. Klaver, *Adamson* 4529.

CLANWILLIAM. Bidouw, *Maguire* 1351 (NBG).

HAY. Witwater, *Burchell* 2070 (K): Honeynest Kloof, *Wilman* 17106 (BOL).

HERBERT. Between Douglas and Campbell, *Pole-Evans* 17 (K, PRE).

Ser. 2. **Robustae** Adamson ser. nov.

Fruticosae compactae erectae ramosissimae. Folia parva subcarnosa saepius revoluta. Flores parvi axillares. Fructus 4-pterus.

Much branched compact shrublets usually erect. *Leaves* small, semi-succulent, usually revolute. *Flowers* axillary, small. *Fruit* 4-winged.

The type species is *T. robusta* Fenzl.

A series allied to and certainly a xerophytic derivative from the series *Fruticosae*, differing in the compact much branched habit, the succulent revolute leaves and small axillary flowers.

The descriptions of the species in Fl. Capensis and the key characters used there are neither satisfactory nor do they agree with the specimens. The species have been redescribed in accordance with the features of the type specimens and those of living ones. One of Fenzl's species has been reduced to a variety.

All the species in this series are much eaten by sheep and goats and are often found in a misshapen eaten-down condition in which discrimination is not possible in the absence of fruit.

KEY TO THE SPECIES.

1. Flowers in groups.
    2. Leaves sessile, sheathing at the base .. .. .. *robusta*
    2. Leaves narrowed to a petiole, not sheathing: fruit without secondary ridges .. .. *sarcophylla*
1. Flowers solitary: fruit with a ridge or tubercle between the wings .. .. *distorta*

11. **T. robusta** Fenzl in Fl. Cap. 2. 467. 1862.

A much branched compact erect shrublet, 10 cm.—1 m. high, with ascending branches. Young *stems* rather thick, 2—3 mm. diam., pale-coloured, papulose, the older powdery, terete but with distinct decurrent lines. *Leaves* sessile, rather succulent, green, spreading, oblanceolate, ovate or oblong, 0·5—1 cm. long, 0·2—0·5 cm. wide, papulose, revolute or rolled, rarely flat, obtuse at the tip, at the base narrowed to a clasping sheath. *Flowers* sessile or on very short pedicels, usually in groups of 2—5. *Perianth* densely papulose, the segments 4, 2 mm. long, broadly ovate, subacute. *Stamens* about 15: anthers oval-oblong, bright yellow. *Styles* 1, less commonly 2. *Fruit* winged, olive-green changing to brown, rounded, 0·4—1·5 cm. long and wide, papulose when young, then powdery, finally glabrous, deeply notched at the top: wings thin, with no intermediate ridges. Ripe fruit on a pedicel 2—5 mm. long.

The type is *Drege* 7041 in herb. Vienna, lectotype *Drege* s.n. (S).

Rocky places at the margins of the karroo.

Rather variable in habit. Often forming long shoots after flowering which bear rather large leaves. In dry conditions the lateral branches may become spinous.

NAMAQUALAND. Silverfontein, *Drege* (S): Graafwater, *Pearson* 3263 (K).

CALVINIA. South of Calvinia, *Acocks* 14440 (PRE): Blauwkrantz Pass, *Adamson* 5081.

VAN RHYNSDORP. Nieuwerust, *Adamson* 4981-2, 4984.

LAINGSBURG. Whitehill, *Archer* (BOL): *Compton* 2920 (BOL), 7778 (NBG), 15171 (NBG).

MONTAGU. Montagu, *Adamson* 5108.

LADISMITH. Warmwaterberg, *Adamson* 4619-20, 5131: *Compton* 20520 (NBG): Prinspoort, *Compton* 8750 (NBG).

ROBERTSON. Robertson Karroo, *Adamson* 5156.

HEIDELBERG. Lemoenshoek, *Adamson* 5150.

PRINCE ALBERT. Prince Albert ,*Bolus* 11912 (BOL).

ALBANY. Cradock Road, Grahamstown, *Dyer* 2117 (GRA, K).

Var. **psiloptera** Adamson comb. nov.

T. psiloptera Fenzl in Fl. Cap. 2. 466. 1862.

Differs in having softer pale-coloured *stems* somewhat swollen at the nodes, less revolute *leaves* narrowed at the base to a wide-clasping sheath, *flowers* on short pedicels, perianth segments narrower and more acute, and *fruit* with a distinct intermediate ridge between the wings. The leaves have coarse marginal hairs just above the sheath.

The type is *Drege* 7052 in herb. Vienna: lectotype *Drege* (Giftberg) (S).

VAN RHYNSDORP. Giftberg, *Drege* (S): Van Rhynsdorp, *Adamson* 4972.

CALVINIA. Tierbosch, *Henrici* 3471 (PRE): Calvinia *Henrici*, 3366 (PRE).

CERES. Beukiesfontein, *Adamson* 4559: Karroo Poort, *Adamson* 4731, 4733.

12. **T. sarcophylla** Fenzl in Fl. Cap. 2. 468. 1862.

A compact much branched shrublet often with elongated ascending or spreading branches up to 40 cm. long. Young *stems* pale-coloured, smooth or slightly papulose, with small decurrent ridges. *Leaves* oblanceolate or linear-oblong, 1—2·5 cm. long, 0·3—0·6 cm. wide, dark green, succulent, finely papulose, flat, revolute or rolled, much narrowed to the base and shortly petiolate. *Flowers* in a raceme-like inflorescence 4—6 cm. long: bracts leaf-like but smaller, often distant. Flowers in groups of 2—6, in each 1—2 bisexual, the others male. Pedicels 0·2—0·5 cm. long. *Perianth* densely papulose, the segments broadly ovate, obtuse, as wide as long. *Stamens* 15—20: anthers oblong-oval, bright yellow or orange. *Styles* 2—3, rarely 1. Fruit 3- or 4-winged, rounded in outline, 1·2—2 cm. long, 1·4—2 cm. wide, papulose when young but glabrescent, black when ripe: wings smooth, with a small oblong bulge between but no ridge.

The type is *Drege* 8018 in herb. Vienna: lectotype in BM.

Margins of the karroo.

Less compact in habit and with less succulent leaves than *T. robusta*. Recognised by the narrow almost petiolate leaves, pedicellate flowers, 2—3 styles, and the larger dark-coloured fruit.

NAMAQUALAND. Springbok, *Hall* 131 (NBG): *Zeyher* 714 (BM, K, S): Bitterfontein, *Bond* 1134 (NBG): *Salter* 963 (BM): *Zeyher* 714 (SAM).

CALVINIA. Nieuwoudtwille, *Maguire* 224 (NBG): Calvinia, *Schmidt* 40 (PRE): de Bosch, *Adamson* 4537: *Henrici* 3396 (PRE).

VAN RHYNSDORP. Nieuwerust, *Steyn* 474 (NBG): Van Rhyns Pass, *Maguire* 148 (NBG).

CLANWILLIAM. Attys, *Schlechter* 8082 (BM, BOL, GRA, K, PRE): Doorn River, *Maguire* 226-7 (NBG): Bidouw, *Maguire* 1851 (NBG).

CERES. Beukisfontein, *Adamson* 4560: Karroo Poort, *Adamson* 4734, 4561-3, 5089.

WORCESTER. Karroo Garden, *Leighton* 1032 (BOL, NBG): Over Hex, *Barker* 5384 (BOL, NBG).

LAINGSBURG. Whitehill, *Compton* 2826 (BOL), 3231 (BM, K), 4721 (BOL), 11198, 14908 (NBG).

ROBERTSON. Robertson Karroo, *Adamson* 4605.

HEIDELBERG. Barrydale, *Adamson* 4587: Lemoenshoek, *Adamson* 4592-3, 5117, 5140.

RIVERSDALE. Muiskraal. *Adamson* 4602: North of Garcia's Pass *Adamson* 4599.

UNIONDALE. Uniondale, *Fourcade* 4375 (BOL, K).

UITENHAGE. Road to Addo, *Long* 1308 (K, PRE).

ALBANY. Cradock Road, *Dyer* 1579 (GRA).

SOMERSET EAST. Somerset East, *Bowker* (K).

Without locality:—*Drege* 8018 (BM, K, PRE).

Var. **saxatilis** Adamson comb. nov.

T. saxatilis Phillips Ann. S. Afr. Mus. 9. 106. 1913.

Differs in being less compact, often almost prostrate, and less branched. *Leaves* broader and less revolute. *Flowers* larger, in an erect inflorescence with minute or no bracts.

The type is *Phillips* 7500 (SAM).

VAN RHYNSDORP. Giftberg, *E. P. Phillips* 7500 (K, SAM).

CLANWILLIAM. Bidouw, *Marloth* 6553 (PRE).

13. **T. distorta** Fenzl in Fl. Cap. 2. 467. 1862.

Compact, much branched. Young *stems* pale-coloured, strongly papulose, almost 4-angled owing to the prominent decurrent ridges, the branches often divaricate. *Leaves* oblanceolate, revolute, succulent, papulose, 1—6 cm. long, 0·2—0·4 cm. wide, narrowed at the base to a very short petiole. *Flowers* axillary, solitary, on pedicels 0·5—0·8 cm. long. *Perianth* densely papulose, the segments ovate, obtuse, cucullate. *Styles* 1—3. *Fruit* 4-winged, black when ripe, 1—1·5 cm. long, as wide or slightly wider, with a raised tubercle or small ridge between the wings.

The type is *Drege* 7044 in herb. Vienna: lectotype *Drege* (Ebenezer) in herb. Sonder (S).

Much like *T. sarcophylla* but more compact, with subsessile leaves, solitary flowers, and fruit with an intermediate ridge. Apparently rare. It is maintained as a separate species with some doubt.

NAMAQUALAND. Wallekraal, *Adamson* 5044.

VAN RHYNSDORP. Ebenezer, *Drege* (S).

?LADISMITH. North of Barrydale, *Adamson* 5119?.

Ser. 3. **Salignae** Adamson nom. nov.

Sect. *Haplogonia* Fenzl in Fl. Cap. 2. 461. 1862.

Erect or sprawling shrublets. *Leaves* narrow, not succulent, petiolate. *Flowers* axillary, solitary or in groups, sessile or very shortly pedicellate. *Perianth* segments connate at the base. *Stamens* many. *Ovary* slightly projecting at the top. *Fruit* small, not winged, either smooth or ridged.

The type species is *T. saligna* Fenzl.

KEY TO THE SPECIES.

1. Styles 2—4 .. .. *Haworthii*
1. Style 1.
  2. Flowers mostly solitary: fruit almost smooth .. .. *erecta*
  2. Flowers in groups: fruit when dry with 4—8 ridges or angles.
    3. Flowers densely covered with hair-like scales: perianth segments cucullate: cone at base of style minute .. *lasiantha*
    3. Flowers glabrous or covered with very short papillae: perianth segments flat: ovary projecting as a distinct cone.
      4. Leaves lanceolate or oblong-lanceolate: fruit with 4 projecting angles.
        5. Cone at base of style small .. .. .. *saligna*
        5. Cone at base of style as long as the perianth .. *saligna* var. *extrusa*
      4. Leaves deltoid-oblong: fruit 8-ridged .. .. *saligna* var. *latifolia*

14. **T. saligna** Fenzl in Fl. Cap. 2. 469. 1862.

A rather lax sprawling or suberect woody plant. *Stems* up to 60 cm. long, the ultimate slender and not branched, pale-coloured, with faint decurrent lines. Young stems papulose, the older glabrous. *Leaves* linear-lanceolate to oblong-lanceolate, 1—4 cm. long, 0·3—1 cm. wide, the upper smaller and narrower: petioles 0·1—0·4 cm. long, often very short in the upper leaves. Leaves flat, not succulent. *Flowers* axillary, in groups, the uppermost with very small subtending leaves. Pedicels wanting or up to 1·5 mm. long. Perianth covered with very short papillae, brown outside, yellow inside, the segments distinctly connate at the base. *Stamens* 15—20: anthers bright yellow, linear-oblong, as long as the filaments. *Style* 1, stout, longer than the stamens. *Fruit* ovoid, 3—4 mm. long, 2—3 mm. diam., dark green, black when ripe, truncate at the top, rounded at the base, with 4 prominent and 4 small ridges.

The type is *Drege* 7037 in herb. Vienna: neotype *Ecklon & Zeyher* (R. Sonderend) in herb. Sonder (S).

Generally among rocks in the drier parts of the coastal belt and the margins of the karroo.

Rather variable in habit. The lower flower groups are distant but those at the top often contiguous. Ecklon & Zeyher distributed specimens of this species under the name *T. linearis* Haw.

CALVINIA. Lokerberg, *Acocks* 17341 (PRE).

CLANWILLIAM. Zeekoe Vlei, *Schlechter* 8505 (BM, BOL, GRA, K, PRE), 8515 (S): Pakhuis Pass, *Bolus* 8992 (BOL, K): Wuppertal, *Bolus* (BOL): Bidouw, *Maguire* 1881 (NBG): Olifants River, *Adamson* 4490.

VAN RHYNSDORP. Nardouw Kloof, *Stokoe* (SAM).

CERES. Karroo Poort, *Adamson* 4729: *Hafstrom & Acock* 440 (K, PRE, S): *Wall* (S).

WORCESTER. Verkeerde Vlei, *Adamson* 5093-4: Karroo Gd., *v. Breda* 174 (K, PRE).

LAINGSBURG. Bantams, *Compton* 12134 (NBG): Matjesfontein, *Foley* 129 (PRE).

PIKETBERG. Papkuil, *Bond* 553 (NBG): Eendekuil, *Howes* 186 (K, PRE).

HOPEFIELD. Hopefield, *Schlechter* 5236 (GRA).

CALEDON. Rivier Sondereinde, *Ecklon & Zeyher* (S).

ROBERTSON. Robertson Karroo, *Adamson* 4660, 4656, 5153.

HEIDELBERG. Barrydale, *Adamson* 5113: *Galpin* 4068 (PRE).

RIVERSDALE. Derde River, *Muir* 3749 (BOL, PRE).

OUDTSHOORN. North side Robinson Pass, *Compton* 23044 (NBG).

GEORGE. George, *Bolus* 2313 (K).

Var. **latifolia** Adamson var. nov.

A typo differt caulibus robustioribus carinis decurrentibus prominentibus, foliis distantibus subdeltoideis marginibus revolutis, perigonii segmentis obtusis, fructibus majoribus basi cuneatis.

Much stouter than the typical form. *Stems* 4-angled with projecting decurrent ridges. *Leaves* usually distant, broad-ovate or subdeltoid, widest near the base, revolute at the edges. *Perianth* segments broadly oval, obtuse. *Fruit* about 4 mm. long, 3 mm. diam., cuneate at the base, when dry with 8 projecting ridges.

The type is *Adamson* 4998 (BOL).

NAMAQUALAND. Wallekraal, *Adamson* 4998.

LAINGSBURG. N'Gaap Kop, *Compton* 3607 (NBG).

RIVERSDALE. North of Garcias Pass, *Adamson* 4829 (PRE).

Without locality:—*Ecklon* 2121 (K).

Var. **extrusa** Adamson var. nov.

A typo differt styli base conico anthesin perigonio aequilongo tandem perigonio longiore.

Low growing. Like *T. saligna* but the *flowers* solitary or in pairs, and the top of the *ovary* projecting as a papulose-hirsute cone as long as the perianth at the flowering stage and longer in fruit.

The type is Adamson 5072 (BOL).

CLANWILLIAM. East side Pakhuis Pass *Adamson* 5072: Graafwater, *Adamson* 4500.

15. **T. lasiantha** Adamson sp. nov.

T. salignae affinis sed differt floribus papulis elongatis piliformibus dense obtectis, perigonii segmentis cucullatis, stylo basi minute conico, fructibus parvis quadricarinatis.

A lax sprawling much branched shrublet up to 60 cm. long. Young *stems* densely papulose-hirsute, the older subglabrous. *Leaves* oblong-lanceolate, 1·5—3 cm. long, 0·2—0·7 cm. wide, rather abruptly narrowed to a petiole 0·2—0·4 cm. long. Leaves quite flat, thinly papulose-hirsute below. *Flowers* in crowded axillary clusters of 2—5, the upper subtending leaves very small. Flowers sessile or very shortly pedicellate, densely covered with hair-like papillae. *Perianth* segments broadly ovate, cucullate. *Anthers* linear-oblong. *Style* 1, often slightly bifid, on a minute conical projection. *Fruit* 3—5 mm. long, 3—4 mm. diam., slightly narrowed at the base, almost glabrous, when dry with 4 ridges.

The type is *Adamson* 5115 (BOL).

Sheltered bushy places in the Little Karroo.

MONTAGU. West of Barrydale, *Adamson* 5115.

HEIDELBERG. Lemoenshoek, *Adamson* 4591.

ROBERTSON. West of Robertson, *Adamson* 4653.

16. **T. erecta** Adamson sp. nov.

Parva suffruticosa erecta. Caules e base ramosi angulati. Folia oblonga obtusa breviter petiolata. Flores axillares solitarii sessiles. Stamina 4—10. Stylus 1, basi conico circa dimidio perigonii aequilongo. Fructus ovoideus vix carinatus.

A small suberect plant 10—15 cm. high, with many erect *stems* from the base. Stems pale-coloured, distinctly ridged. *Leaves* oblong, 0·3—1 cm. long, 0·3—0·4 cm. wide: petiole 0·1—0·2 cm. long. *Flowers* axillary, solitary, sessile. *Stamens* 4—10: anthers linear-oblong, pale yellow. *Style* 1, on a cone at least half as long as the perianth. *Fruit* ovoid, 4—5 mm. long, 2—3 mm. diam., smooth when fresh, obscurely 4-ridged when dry.

The type is *Adamson* 4828 (BOL).

SWELLENDAM. Bonnievale, *Acock* 1603 (S).

RIVERSDALE. Muiskraal, *Galpin* 4069 (GRA, PRE): North of Garcias Pass, *Adamson* 4828.

17.? **T. Haworthii** Fenzl in Fl. Cap. 2. 468. 1862.

Stems woody, sprawling, terete, pale-coloured. *Leaves* flat, lanceolate or oblong, 2—3 cm. long, 0·3—0·9 cm. wide, with a petiole 0·1—0·3 cm.

long. *Flowers* in groups of 1—4 in the upper axils, the uppermost leaves very small. *Perianth* somewhat papulose, the segments broad-ovate, acute. *Styles* 2—4, on a very small projecting cone. *Fruit* ovoid, truncate at the base, 4—5 mm. long, 3—4 mm. diam., with four obtuse slightly projecting ridges.

A doubtful species of which authentic specimens have not been seen. In a note to the original description Fenzl suggested that it might be merely a form of *T. saligna.* The above description is based on plants collected in the Little Karroo which can be separated from *T. saligna* by the more leafless inflorescence, the number of styles, and the fruit with less prominent ridges.

HEIDELBERG. Lemoenshoek. *Adamson* 5145.

Ser. 4. **Decumbentes** Adamson ser. nov.

Perennes carnosae herbaceae vel basi tantum lignosae. Folia papulosa. Flores axillares. Fructus viridis papulosa tetraptera.

Stout erect or prostrate rather succulent perennials. *Stems* thick, herbaceous or woody at the base only. *Leaves* papulose, succulent. *Flowers* axillary. *Fruit* winged, green at least when young, papulose.

The type species is *T. decumbens* Mill.

KEY TO THE SPECIES.

1. Decumbent: papulose-hirsute: leaves obovate: flowers pedicellate: fruit with rigid wings .. .. *decumbens*
1. Erect: leaves elliptical: fruit with soft wings.
  2. Glistening: leaves narrowed to the base: flowers sessile: fruit over 1 cm. long .. .. *verrucosa*
  2. Papulose-hirsute: leaves narrowed at both ends: flowers pedicellate: fruit less than 1 cm. long .. .. .. *namaquensis*

18. **T. decumbens** Mill. Gard. Dict. ed. 8. 1768. *T. obovata* Haw. Rev. Pl. Succ. 73. 1821. *T. Zeyheri* Fenzl in Fl. Cap. 2. 465. 1862. *T. perfoliata* Druce Rep. Bot. Ex. Club Br. Is. 1916. 650. 1917. ?*T. tetrapteris* Haw. Misc. Nat. 2. 121. 1803. ?*Aizoon perfoliatum* Linn. f. Supp. Pl. 261. 1781.

Prostrate, partly succulent, covered all over with glistening papillae and some hairs. *Stems* stout, 3—5 mm. diam., woody when old, terete but with narrow decurrent lines. *Leaves* oblong, obovate or nearly orbicular, obtuse, narrowed to the base but not petiolate, 1—6 cm. long, 0·5—3 cm. wide, flat or more commonly recurved at the edges or revolute. *Flowers* in the upper axils, shorter than the leaves, in groups of 3—5. Pedicels 0·3—1 cm. long, densely papulose. *Perianth* densely papulose, the segments 4, broad, incurved at the tip, obtuse or acute in male flowers. *Stamens* many: anthers linear-oblong, yellow. *Styles* 4—5 but 3, 2, or 1 in transitional flowers. *Fruit* 0·8—1·5 cm. wide, 1 cm. long, flat on top, the 4 wings rigid, with a small intermediate ridge between.

The type is t. 263 in Mill. Fig. Pl. Gd. Dict. 2. 1760.

Sand, most common on the sea shore but extending a short distance inland.

Very variable in size and in leaf-shape. *T. Zeyheri* (type *Zeyher*, Rietvalley) only differs in being more erect and in having more revolute leaves with prominent decurrent ridges. It is merely a form from rather a dry habitat and is connected by all stages of intermediate. The varieties described by Fenzl (Fl. Cap. l.c. 464) a. *obovata*, b. *ovalifolia* and c. *oblongifolia* cannot be upheld.

The type of *T. tetrapteris* Haw. has not been seen but the description seems to agree. Specimens so labelled are either this species (*Zeyher* S.) or *T. fruticosa* (*Wallich* BM). *Aizoon perfoliatum* is a doubtful species which Druce (l.c.) considered to be this species though the description does not agree.

S.W.A. Luderitz, *Pillans* 5981 (BOL): *Rogers* 18321 (BOL).

NAMAQUALAND. Wallekraal, *Pillans* (BOL).

CARNARVON. Karreeberg, *Burchell* 1577 (K).

CAPE. Dassen Is., *Marloth* 6691 (PRE): Robben Is., *Walgate* 484, 611 (NBG): *Wilms* 3226 (K): Rietvlei, *Walgate* 771 (BOL): *Zeyher* (SAM): Strandfontein, *Adamson* 4738, 4741: *Pole-Evans* 4393 (PRE): Paarden Is., *Wolley-Dod* 3501 (BOL, K): Table Bay, *Ecklon* (S): *Prior* (K): *Zeyher* (SAM): Salt River, *Gerstner* 6139 (PRE): Mouille Pt., *Zeyher* 4924 (SAM), s.n. (SAM): Green Point, *Adamson* 1826 (BOL): Camps Bay, *Maude* 88 (K): *Moss* 3271 (BM): Lakeside, *Adamson* 3710: Muizenberg, *Michell* (CT): St. James, *L. Bolus* (CT): *Moss* 18177 (BM): *Wolley-Dod* 247 (BOL): 2147 (BOL, BM): Kalk Bay, *Zeyher* (SAM): Glencairn, *Salter* 270/10 (BM): Simonstown, *Wright* (K): Platboom, *Adamson* 3333 (CT), 3334: Buffels Bay, *Levyns* 7883 (CT): Cape Point, *Goulimis* (NBG).

STELLENBOSCH. Strand, *Hafstrom* (S): *Rogers* (K).

BREDASDORP. Arniston, *Galpin* 11341 (K, PRE).

MOSSEL BAY. Mossel Bay, *Rogers* 4251 (BOL, GRA).

OUDTSHOORN. Oudtshoorn, *Bolus* (BOL).

GEORGE. Wilderness, *Compton* 14332 (NBG).

KNYSNA. Groote River, *Fourcade*, 1463 (BOL, GRA): 1977 (BOL GRA, K): Keurbooms River, *Codd* 3571 (PRE): *Compton* 23551 (NBG).

HUMANSDORP. Slang River, *E. P. Phillips* 1631 (K).

UITENHAGE. Uitenhage, *Zeyher* 398 (BM, K): Swartkops River, *Ecklon* 138 (GRA): *Theron* 576 (PRE): *Zeyher* 2318 (S), 2631 (S, SAM), s.n. (SAM).

PORT ELIZABETH. Port Elizabeth, *Cruden* 481 (GRA): *Drege* (S): *Ecklon* (S): *Ecklon & Zeyher* 2128 (GRA): *Holland* 3765 (BOL): *Kemsley*

(GRA): *Zeyher* 2126 (S, SAM), s.n. (SAM): Humewood, *Long* 221 (GRA, K): *Paterson* 617 (GRA).

BATHURST. Port Alfred, *Adamson* 5255: *Barker* 2322 (NBG): *Bennie* 308 (GRA): *Britten* 674 (GRA, PRE): *Dyer* 2017 (GRA, K, PRE): *Galpin* 313 (PRE): 1838 (PRE): *Rogers* 28065 (GRA): *Salisbury* 43 (GRA): *Schonland* 1533 (GRA, PRE): *Tyson* (PRE).

EAST LONDON. East London, *Galpin* 1838 (BOL): Buffalo River, *Rattray* 1272 (PRE): Nahoon, *Nanni* 85 (PRE).

KOMGHA. Kei Mouth, *Flanagan* 616 (GRA, PRE, SAM).

KENTANI. Kentani, *Edwards* (BOL): *Pegler* 1314 (BM, BOL, GRA, K, PRE, SAM).

WILLOWVALE. Qora River, *Hilner* 454 (GRA, PRE).

Cultivated:—*Anderssen* (S).

19. **T. verrucosa** Fenzl in Fl. Cap. 2. 465. 1862.

A stout glistening succulent herb. *Stems* erect or semi-erect, woody at the base, much branched, the branches often divaricate. Young stems pale-coloured, 2—4 mm. diam., densely papulose and with a few scales. *Leaves* palish green, succulent, papulose, oblanceolate, oblong or elliptical, up to 3·5 cm. long and 0·8 cm. wide, narrowed at the base but not petiolate, usually revolute. *Flowers* sessile or nearly so, in groups of 2—3, the upper with very small bracts, the uppermost male, often crowded. *Perianth* densely papulose, the segments broadly ovate, subacute. *Stamens* numerous: anthers oblong, fawn-coloured. *Styles* 2, thick, dark-coloured. *Fruit* 4-winged, papulose, green, rounded in outline but indented at the top, 1·5—2 cm. long, and wide, the wings when dry reticulately veined.

The type is *Drege* 7031 in herb. Vienna, lectotype (K).

Shale rocks in the karroo.

S.W.A. Luderitz, *Kinges* 2636 (PRE).

NAMAQUALAND. Sabatsfontein, *Maguire* 406 (NBG).

VAN RHYNSDORP. Ebenezer, *Drege* (S): Nieuwerust, *Adamson* 4983: Strandfontein, *Acocks* 15015 (K, PRE).

WORCESTER. Karroo Gdn., *Barker* 5923 (NBG): *van Breda* 120 (BOL, PRE): Orchard, *Rogers* 16771 (K).

ROBERTSON. West of Robertson, *Adamson* 5155: *Melle* (BOL, NBG): *Morris* 151 (NBG): Ashton, *Adamson* 4649.

MONTAGU. Koo, *Adamson* 5105: Barrydale, *Adamson* 5116, 5118.

HEIDELBERG. Lemoenshoek, *Adamson* 4596, 5132, 5139: Road to Garcias Pass, *Adamson* 5144.

PRINCE ALBERT. Prince Albert, *Bolus* 11513 p. pte. (PRE).

Without locality:—*Drege* 7031 (K).

20. **T. namaquensis** Schltr. Bot. Jahrb. 27. 124. 1900.

An erect succulent papulose herb. *Stems* woody at the base, the younger densely papulose-hirsute but not glistening. *Leaves* papulose-hirsute, narrow-lanceolate, up to 6 cm. long, 0·4—0·6 cm. wide, narrowed at both ends, at the base almost petiolate, revolute. *Flowers* in a spike-like inflorescence, in groups. Pedicels 0·3—0·6 cm. long. Upper bracts very small or wanting. *Perianth* densely papulose-hirsute. *Stamens* many: anthers oblong, yellow. *Styles* usually 3, less often 4 or 5. *Fruit* densely papulose-hirsute, less than 1 cm. long and wide, 4-winged, retuse at the top, slightly narrowed at the base.

The type is *Schlechter* 8184.

Shale rocks in the arid N.W. coastal belt.

Much like *T. verrucosa* but more slender, with narrower almost petiolate leaves, pedicellate flowers and smaller fruit.

NAMAQUALAND. Wallekraal, *Adamson* 5032.

VAN RHYNSDORP. Kareeberg, *Schlechter* 8184 (BM, BOL, GRA, K, PRE, S): North of Van Rhynsdorp, *Godman* 741 (BM).

CLANWILLIAM. Heerenlogement, *Pearson* 6784 (BOL).

PIKETBERG. Sauer, *Steyn* 548 (NBG): Zootkloof, *Barker* 5806 (NBG): Piketberg, *van Breda* 350 (PRE): Redelingshuis, *Compton* 15048 (NBG).

CALVINIA. Botter Kloof, *Maguire* 204 (NBG).

Without locality:—*Drege* 7050 (S).

Series 5. **Macranthae** Fenzl in Fl. Cap. 2. 461. 1862.

Perennial herbs woody at the base only, usually coarsely hairy. *Leaves* flat, petiolate, not succulent. *Flowers* large, the perianth segments 0·5—1 cm. long, brightly coloured inside. *Stamens* many. *Styles* 2—4. *Fruit* large, with 4 thin dry wings.

The type species is *T. hirsuta* L. f.

KEY TO THE SPECIES.

1. Flowers yellow: perianth segments hispid, erect, connate and constricted at the base: leaves hispid . . . . *hirsuta*
1. Flowers purple-red: perianth segments thinly hairy, spreading, free: leaves ciliate . . . . *rosea*

21. **T. hirsuta** Linn. f. Supp. Pl. 258. 1781. *T. villosa* Poir. Enc. Meth. Bot. 7. 604. 1806.

A coursely hary rather rigid erect or ascending herb, up to 50 cm. high. *Stems* woody at the base, persistent but the flowering seasonal. Young stems stout, 3—5 mm. diam., covered with stiff spreading hairs. *Leaves* coarsely hairy all over, decreasing in size from below upwards, the lower elliptical or oblong, 2—6 cm. long, 1—2 cm. wide, narrowed at both ends, the upper lanceolate, 0·6 cm. or less wide, very shortly petiolate. *Flowers* on erect branches in axillary groups of 2—4. Pedicels densely hairy, 2—5 mm. long. *Perianth* brownish or greenish-brown and hispid outside, bright yellow inside: segments 5—7 mm. or occasionally more long, connate and constricted at the base, the lobes flat, oblong, obtuse. *Stamens* numerous, less than half as long as the perianth: anthers narrow-oblong. *Ovary* densely hispid with spreading hairs: *styles* 3, less often 2 or 4, as long as the stamens. *Fruit* 1·2—2·5 cm. long, 0·9—2·2 wide, rounded at the base, flat or emarginate at the top, with a coarsely hairy tubercle between the slightly undulate wings.

The type is in herb. Thunberg, Uppsala.

Sandy soils in dry sclerophyll country in the Clanwilliam region.

CALVINIA. Nieuwoudtville, *Leipoldt* (BOL): Lokerberg, *Acocks* 17082 (PRE): Doorn River. *Hugo* (GRA): Botter Kloof. *Compton* 20906 (BOL, NBG).

VAN RHYNSDORP. Van Rhynsdorp, *Adamson* 4539: Sandkraal, *Acocks* 14837 (K, PRE): Knechtsvlakte, *Leipoldt* 4019 (BOL): Klaver, *Steyn* 405 (NBG): Nardouw, *Lewis* (SAM): *Stokoe* (SAM).

CLANWILLIAM. Clanwilliam. *Adamson* 4488: *Pappe* (SAM): Barrage. *Compton* 11341 (NBG): Alpha Farm, *Salter* 7557 (BOL): Bulshoek. *Maguire* 931 (NBG): Brakfontein, *Ecklon & Zeyher* 2120 (GRA, S, SAM): *Zeyher* 76 (S). s.n. (S): Heerenlogement, *Zeyher* 713 (BM. BOL, K, PRE. S. SAM): Zeekoe Vlei. *Levyns* 1236 (CT): Berg Vlei. *Compton* 20039 (NBG): Olifants River. *Schlechter* 5043 (BM, K. S.): *Steyn* 499 (NBG): *Wilman* 848 (BOL): *Zeyher* 9 (SAM), s.n. (SAM).

PIKETBERG. Eendekuil, *Hafstrom & Acock* 439 (PRE, S): Het Kruis, *Barker* 2584 (NBG): *Stephens & Glover* 8716 (K): Sauer, *Compton* 15092 (NBG): Piketberg, *Barker* 5772 (NBG): *Bolus* 13557 (BOL): *Edwards* 167 (BOL): *Esterhuysen* 5599 (BOL): *Guthrie* 2609 (NBG): *Thorne* (SAM): Kapiteins Kloof, *Stokoe* (SAM): Elandsberg. *Pillans* 7900 (BOL): Porterville, *Schlechter* 4897 (BM. K. PRE. S): 4899 (GRA): Berg River, *Pillans* (BOL): Road to Clanwilliam, *Godman* 546 (BM).

WORCESTER. Du Toits Kloof, *Drege* (S).

Without locality:—*Drege* (BM, K): *Ecklon & Zeyher* 2130 (K, PRE): *Masson* (BM): *Pearson* 7783 (K): *Zeyher* s.n. (K).

22. **T. rosea** Schltr. Bot. Jahrb. 27. 124. 1900.

A hairy sprawling herb growing from a tap root. *Stems* up to 60 cm. long, terete, woody at the base, the youngest with spreading hairs, the hairs often red. *Leaves* dark green or purplish, 2—7 cm. long, 0·5—1·7 cm. wide, elliptical or oblong, much narrowed at both ends, petiolate. Leaf blades flat, hairy at the edges and on the midrib below. *Flowers* in the upper axils, solitary or 2—3 together. Pedicels 1—8 mm. long, densely hairy. Bracts smaller than the leaves, the upper very small. *Perianth* hairy, dark purplish outside, red or red-purple inside, the segments almost free, 0·5—0·9 cm. long, acute. *Stamens* numerous, about two-thirds as long as the perianth: anthers ovate, yellow. *Ovary* densely hairy, the hairs commonly red. *Styles* 2—3, slightly longer than the stamens. *Fruit* 1·5—2 cm. long, 1·5—1·8 cm. wide, the wings with coarse hairs on the edges. A distinct ridge, sometimes coarsely hairy, between the wings.

The type is *Schlechter* 7993.

Rocks or rocky places in the dry sclerophyll in the Clanwilliam region.

CALVINIA. Willems River, *Leipoldt* 867 (BM, K, SAM).

VAN RHYNSDORP. Klaver, *Andreae* 445 (PRE): *Compton* 20691, 20721 (NBG): Nardouw, *Compton* 20765 (NBG): *Johnson* 239 (NBG): Nardouw Pass, *Stokoe* (SAM).

CLANWILLIAM. Clanwilliam, *Adamson* 4471, 4487, 4955: *Barker* 6191 (NBG): *Bond* 1076 (NBG): *Bolus* 8993 (K, NBG, PRE): *Guthrie* 4816 (NBG): *Henrici* 2109, 3459, 3469 (PRE): *Maguire* 122 (NBG): *Smuts* (PRE): *Thode* A1999 (PRE): Pakhuis Pass, *Adamson* 4519: *Godman* 584 (BM): Bidouw, *Maguire* 1849 (NBG): Lamberts Bay, *van Nouhuys* (PRE): Bulshoek, *Johnson* 183, 186 (NBG): Brandewyn River, *Maguire* 259 (NBG): Karrooberg, *L. Bolus* (NBG, PRE): Olifants River, *Acocks* 15199 (K, PRE): *Compton* 20020, 20963 (NBG): *Galpin* 11507 (K, PRE): *Schlechter* 7993 (BM, GRA, K, PRE, S): *Steyn* 377 (NBG): *Story* 2963 (K, PRE): Krydouw, *Steyn* 520 (NBG): Krantzvlei, *Gillett* 4042 (PRE): Hex River, *Esterhuysen* (NBG, 1317/37): Citrusdal, *Compton* 4282 (NBG): *Hall* 123 (NBG): Modderfontein, *MacGregor* 205 (K).

PIKETBERG. Het Kruis, *Stephens & Glover* 8722 (BM): de Hoek, *Compton* 19955 (NBG).

Ser. 6. **Pedunculares** Fenzl in Fl. Cap. 2. 460. 1862.

Prostrate or sprawling herbs usually tuberous. Aerial *stems* annual. *Flowers* rather large, axillary and terminal, solitary or more often in cymes or cymose umbels. Pedicels long. *Fruit* winged or not.

The type species is *T. herbacea* L.

KEY TO THE SPECIES.

1. Fruit winged.
    2. Flowers in terminal or axillary umbellate groups: lower leaves obtuse.
        3. Lower leaves broad-ovate or rotund: axillary flowers all along the stem: styles as long as the stamens . . . . . . *nigrescens*
        3. Lower leaves narrow-oblong or obovate: flowers only at the top of the stem: styles distinctly longer than the stamens . . *portulacoides*

- *2.* Flowers all axillary.
  - 4. Flowers in umbellate groups: lower leaves obtuse .. .. *nigrescens*
  - *4.* Flowers solitary: lower leaves acute or subacute .. .. *halimoides*
- *1.* Fruit not winged.
  - 5. Flowers mostly in a terminal umbel: fruit conical, smooth, with projecting angles when dry .. .. *herbacea*
  - *5.* Flowers solitary, axillary: fruit spherical, covered with crowded rigid scales .. .. *sphaerocarpa*

23. **T. nigrescens** Ecklon & Zeyher Enum. 323. 1837. *T. heterophylla* E. & Z. l.c. 324. (*p. pte*).

A soft slightly succulent prostrate herb, green or purplish. Underground part a fusiform or cylindrical tuber. *Stems* much branched, up to 50 cm. long, glabrous or more commonly papulose or covered with hair-like scales. *Leaves* papulose, petiolate, variable in size and shape, the lower larger, broadly oval or almost orbicular, 1—8 cm. long, 0·6—3·5 cm. wide, obtuse, gradually narrowed at the base to a petiole 0·5—3 cm. long, the upper smaller, narrower and more pointed. *Flowers* numerous, bisexual and male, pedicellate, terminal and axillary, on the main stem and on short lateral branches, in umbellate groups of 2—7 or the lowest occasionally solitary. Flowers not confined to the apical region. Pedicels slender, either papulose or hairy, 0·5—2·5 cm. long, but most commonly 0·5—1·2 cm. *Perianth* green, papulose or hairy, the segments 4 or 5, about 3 mm. long, broadly ovate, more or less acute. *Stamens* numerous, half as long as the perianth: anthers yellow, oval or oblong, half as long as the filaments. *Styles* 3—4, as long as or slightly longer than the stamens. *Fruit* black, 4-winged, 0·5—1·5 cm. long and about as wide, indented at the top, slightly narrowed at the base, the wings rather thin, smooth, with an inconspicuous intermediate tubercle between.

The type is *Zeyher* (Grootepost) in herb. Berlin: lectotype in herb. Sonder, (S).

Sand at rather low altitudes.

The whole plant usually becomes black on drying. Variable in size, leaf-shape, degree of hairiness, and in the number and arrangement of the flowers. Axillary umbels are often replaced by short branches bearing small leaves and numerous flowers. The varieties enumerated in Fl. Capensis do not seem to be sharply separable and cannot be maintained.

NAMAQUALAND. Kamiesberg, Wilgekloof, *Pearson* 6807 (BOL, K): above Garies, *Adamson* 5060: s.l. *Drege* (S).

CALVINIA. Nieuwoudtville, *Lavis* (BOL): Groot Vlei, *Leighton* 1234 (BOL).

VAN RHYNSDORP. Knechtsvlakte, *Leipoldt* 4017 (PRE, *p. pte.*).

CLANWILLIAM. Pakhuis Pass, *Adamson* 4522, 4964-5: *Compton* 6848 (NBG): do. East side, *Adamson* 5069: Wuppertal, *Bolus* (BOL): Clanwilliam, *Adamson* 4497-9: Lange Kloof, *Schlechter* 8034 (BM, BOL, GRA, K, PRE, S): Vogelfontein, *Levyns* 1168 (CT): Zeekoevlei, *Bond* 1072 (NBG): Graafwater, *Adamson* 4505, 4507: *Leipoldt* 4020 (BOL): Uitkomst, *Esterhuysen* 5000 (BOL): Brakfontein, *Zeyher* 2119 (S), s.n. (S, SAM): Olifants River, *Ecklon & Zeyher* (76.7) (PRE): *E. P. Phillips* (BOL): Warm Baths, *Compton* 5381 (NBG): *E. P. Phillips* 7244 (BOL): *Stephens* 7244 (K): Modderfontein, *Compton* 4326 (BOL): *Gillett* 3697 (BOL): Road to Elands Kloof, *Story* 2996 (PRE): Greys Pass, *Maguire* 100 (NBG).

PIKETBERG. Het Kruis, *Barker* 6373 (NBG): *Stephens & Glover* 8717 (BOL, K): Piketberg, *Bolus* 7542-3 (BOL): *Guthrie* (NBG): *Steyn* 529 (NBG): *Zeyher* 715 (BM, K, PRE, S, SAM): Versvelds Pass, *Compton* 10903 (NBG).

HOPEFIELD. Hopefield, *Bolus* 12694 (BOL): Darling, *Hutchinson* 215 (K).

MALMESBURY. Malmesbury, *Cohen* (NBG): *Compton* 7804 (NBG): *Gillett* 3614 (BOL): *Wilman* (BOL): Moorreesburg, *Bolus* 9961 (BOL).

CAPE. Yserfontein, *Esterhuysen* 3055 (BOL): *Cohen* (NBG): Cape Flats, *Zeyher* 7 (SAM), s.n. (S).

STELLENBOSCH. Brakenfel, *Acock* 4637 (S): *Hafstrom & Acock* 438 (PRE, S): Stikland, *Acock* 552 (S).

TULBAGH. Tulbagh, *Bolus* 5300 (BOL), s.n. (BOL).

WORCESTER. Grootpost, *Ecklon* 19 (S): *Zeyher* (S, SAM): Worcester, *Thorne* (SAM).

BREDASDORP. Struys Bay, *Esterhuysen* 2974 (BOL).

Without locality:—*Alexander* (PRE): *Ecklon* 2117, 2119 (K): *Oldenburg* (BM): *Ryder* (K): *Verreaux* (S): *Zeyher* 629 (K).

Specimens (*Adamson* 5073) collected between the north side of Pakhuis Pass and Doorn River may represent a separate species. They differ from *T. nigrescens* in being unusually large, with flowers in axillary groups of 4—8, with rather short pedicels, 0·3—0·5 cm., and with fruit with a distinct intermediate tubercle between the wings. The material is insufficient for accurate determination.

24. **T. portulacoides** Fenzl. Cap. 2. 462. 1862. *T. chenopodioides* E. & Z. Enum. 324. 1837 (*p. pte.*).

Allied to *T. nigrescens* but much smaller, more slender and almost glabrous. Tuber cylindrical. *Stems* several, persistent at the base, usually prostrate, 10—30 cm. long. *Leaves* obovate or oblanceolate, obtuse, narrowed to a petiole, the lower 1—2·5 cm. long, 0·4—0·7 cm. wide, the upper small. *Flowers* confined to the apical region, 2—7 in a terminal umbel, others usually in groups of 2—3 in the upper axils. Pedicels slender, papulose, 1—1·8 cm. long. *Perianth* fawn-coloured, sometimes reddish outside, the segments 4 or 5, linear-oblong 3—4 mm. long, densely papulose outside, concave inside, acute but apparently obtuse owing to the incurved tip. *Stamens* about half as long as the perianth: anthers pale yellow or fawn-coloured, oval. *Styles* 2—4, rarely 5, longer than the stamens, almost as long as the perianth. *Fruit* 4-winged, 0·6—1·7 cm. long, 0·4—1·4 cm. wide with no intermediate ridge or tubercle between the wings.

The type is *Ecklon & Zeyher* 2118 (Rietvalley) (S).

Open sand at low altitudes.

Two distinct species were issued by Ecklon & Zeyher under the type number, 2118, with the name *T. chenopodioides*. The original description of that species is inadequate. Fenzl (l.c.) resolved the confusion. He separated and described the two components retaining the original name for the plant represented by specimens from Saldanha Bay. Those represented by specimens from Rietvalley he described as this species.

Often confused with *T. nigrescens* but distinguished by the slender habit, narrower leaves, flowers confined to the apical region, long pedicels and long styles. This species does not blacken on drying.

CALVINIA. Oorlogs Kloof, *Maguire* 216 (NBG).

WORCESTER. Hex River, *Esterhuysen* 10280 (BOL): *Wolley-Dod* 4627 (BOL).

HOPEFIELD. Darling, *Adamson* 933 (CT): *Marloth* 4027 (PRE): *Stokoe* (SAM).

MALMESBURY. Geelbek, *Barker* 4637 (NBG).

PAARL. Paarl, *Prior* (K).

STELLENBOSCH. Kuils River, *Zeyher* (SAM).

CAPE. Melkbosch Strand, *Compton* 15867 (NBG): Durbanville, *Esterhuysen* 16016 (BOL): Cape Flats, *Adamson* 501 (CT): *Zeyher* (S): Vygeskraal, *Wolley-Dod* 256 (BM): 1510 (BOL, K): Tygerberg, *Bolus* 3864 (BOL): *Burchell* 970 (K): *Ecklon* (S): Rietvalley. *Ecklon & Zeyher* 2118 (S): Paarden Is., *Drege* (S): Salt River, *Marloth* 160 (PRE): Maitland, *Guthrie* 936 (NBG): Raapenburg. *Guthrie* 936 (CT): Muizenberg, *Pappe* (S): *Schlechter* 1259 (BM, GRA, K, S): Chapman's Bay, *Salter* 270/9 (BM): Kommetje, *Adamson* 2914 (CT): *Cross* 35 (NBG).

CALEDON. Gansbaai, *Gillett* 4418 (PRE).

BREDASDORP. Voëlvlei, *Levyns* 8575 (CT).

RIVERSDALE. Botteliersfontein, *Muir* 1632 (PRE).

HUMANSDORP. Humansdorp, *MacOwan* 978 (SAM)

MURRAYSBURG. Murraysburg, *Bolus* (BOL).

Without locality:—*Nelson* (BM): *Oldenburg* (BM).

Specimens (*Bachmann* 1965 (BM, S)) collected at Hopefield may represent a distinct species differing in being much larger and with an elongated rhizome, having smaller obtuse papulose leaves, flowers not in umbels, and styles not longer than the stamens. The specimens are without fruit.

25. **T. halimoides** Fenzl in Fl. Cap. 2. 463. 1862. *T. heterophylla* E. & Z. Enum. 324. 1837 (*p. pte.*).

A rather stout decumbent herb. *Stems* not much branched, covered with coarse spreading hairs. *Leaves* dark green, papulose, ovate or obovate, narrowed at both ends, acute at the tip, gradually narrowed to the petiole: lower leaves 2—5 cm. long, 1·5—3 cm. wide, with petioles 0·5—1·2 cm. long, upper leaves smaller, narrower and with short or no petioles: petioles coarsely hairy. *Flowers* solitary, axillary, on hairy pedicels 1—3 cm. long. *Perianth* green or brown outside, bright yellow inside: the segments 4—5, acute, about 0·5 cm. long. *Stamens* about three-quarters the length of the perianth: anthers oblong. *Styles* 3—5, as long as or slightly longer than the stamens. *Fruit* large, glabrous, 4-winged, 2—2·5 cm. long, 2—3 cm. wide, widest near the base, notched at the top: wings thin, with distinct bulges between.

The type is *Ecklon & Zeyher* 87 in herb. Sond. (S).

Sand or clay, usually among bushes.

Allied to *T. nigrescens* but distinguished by the acute leaves, solitary flowers and large fruit.

PIKETBERG. Cement Works, *Adamson* 4477.

PAARL. Paarlberg, *Ecklon & Zeyher* 68 (S): Berg River, *Ecklon & Zeyher* 87 (S).

Var. **procumbens** Adamson var. nov.

A typo differt caulibus prostratis subglabris, foliis minoribus subcoriaceis superne glabris subtus pallidis, florum pedunculis foliis brevioribus, fructibus alis angustis.

Stems prostrate, ascending at the tip only, thinly hairy at the tips otherwise glabrescent. *Leaves* rhombic-oval, acute, petiolate: blades leathery, 1—3 cm. long, 0·5—0·8 cm. wide, dark green and glabrous above, pale and thinly hairy below: petioles 0·5—1 cm. long. *Flowers* yellow, solitary, on pedicels 0·5—1 cm. long. Wings of the *fruit* narrow.

The type is Adamson 4550 (BOL).

Gravel usually under bushes.

VAN RHYNSDORP. Van Rhyns Pass, *Adamson* 4550.

CALVINIA. Nieuwoudtville, *Lavis* (BOL).

26. **T. herbacea** L. Sp. Pl. 480. 1753.

A prostrate tuberous herb. *Stems* slender, up to 50 cm. long, sometimes unbranched, glabrous or more commonly covered with hairs or scales.

Leaves rather thick, dark green, smooth above, papulose below, petiolate. Lower leaves mostly opposite, the blades rotund or broadly ovate, 1—1·6 cm. long and wide, the petioles 1—2 cm. long: upper leaves alternate, the blades acute, 1—1·5 cm. long, on petioles 0·5—2 cm. long. *Flowers* 2—7 in a terminal umbel, and solitary or paired in the uppermost axils. Pedicels hairy or scaly, 2—6 cm. long. *Perianth* green or red, covered with scales outside, bright yellow inside, the segments acute, 0·3—0·6 cm. long. *Stamens* numerous: anthers linear-oblong, orange-yellow. *Styles* 2—5, not longer than the stamens. *Fruit* smooth, green, conical or pear-shaped, 1—1·5 cm. long, 0·6—1 cm. diam., obtusely 4-angled when fresh, when dry with projecting keels on the angles.

The type is Comm. Hort. 2: 203, t. 102. 1701.

Rather dry clay soils at low altitudes, less common on sand.

A very distinctive species on account of the large flowers on long pedicels and wingless fruit. Variable in the degree of hairiness.

It seems that Linnaeus had not seen this species but took it over from the plate. His description merely repeats the earlier one. There is no specimen either in his herbarium nor in that of Hort. Cliff. The earliest specimen seen is that collected by *Masson* (BM).

VAN RHYNSDORP. Van Rhynsdorp, *Leipoldt* 4017 (PRE *p. pte.* SAM): Knechtsvlakte, *Leipoldt* 4017 (BOL, SAM).

CLANWILLIAM. Krom River, *Zeyher* 3 (SAM): s.n. (S).

PIKETBERG. The Rest, *Levyns* 4017 (CT): De Hoek, *Compton* 10911. 15005 (NBG): Kersfontein, *Esterhuysen* 20126 (PRE): Saron, *Schlechter* 7189 (BOL), 7889 (BM, GRA, K, PRE, S): Berg River, *Burchell* 982 (K).

CERES. Hottentots Kloof, *Levyns* 1510 (CT).

WORCESTER. Groot Post, *Ecklon* (S): *Ecklon & Zeyher* 2115 (S, SAM).

PAARL. Wellington, *Kies* 50 (NBG): *J. B. Thompson* (PRE): Paardeberg, *Alexander* (K).

HOPEFIELD. Hopefield, *Bolus* 12695 (BOL): Mamre, *Baur* 1177 (K): *Salter* 275/13 (BM): *Zeyher* (GRA).

MALMESBURY. Malmesbury, *Compton* 10920 (NBG): *Pillans* 8992 (BOL): Abbotsdale, *Adamson* 4939 (PRE): Kalabas Kraal, *Adamson* 4932: *Hutchinson* 191 (BOL, K, PRE): Berg River, *Pillans* (BOL).

CAPE. Rietvalley, *Pappe* (K, S): Yserfontein, *Acocks* 14525 (PRE): Durbanville, *Acock* 260 (S): Cape Flats, *Bolus* 4027 (BOL): Cape Town, *Bolus* 4027 (BM, K, SAM): *Ecklon & Zeyher* 2115 (SAM): Lion's Head, *Ecklon* (S): *Ecklon & Zeyher* 2115 (GRA): Signal Hill, *Adamson* 1857 (CT): *Levyns* (CT): *Salter* 8216 (BOL): *Pappe* (K): *Wolley-Dod* 1170 (K): Green Point, *Prior* (K): Sea Point, *MacOwan* 3385 (GRA), s.n. (SAM): *Page* (CT):

Wolley-Dod 1079 (BM): Llandudno, *Compton* 8894 (NBG): Raapenburg, *Guthrie* 605 (CT): Observatory, *Adamson* 2526, 2539 (CT): *Kensit* (CT).

CALEDON. Caledon, *Garside* 295 (K).

BREDASDORP. Welgelegen, *Compton* 19506 (NBG).

MONTAGU. Montagu, *Leipoldt* (BOL).

Without locality:—*Alexander* (BM): *Ecklon & Zeyher* 2115 (S): "Hort. Chelsea" (BM): *Masson* (BM): *Pappe* (S).

27. **T. sphaerocarpa** Adamson sp. nov.

Herba decumbens hispido-papulosa. Folia late ovata vel superiores lanceolata breviter petiolata. Flores solitarii axillares. Ovarium dense hispidum, styli 3. Fructus apterus sphaericus squamulis subrigidis densissime obtectus.

Sprawling, papulose. *Stems* up to 45 cm. long, the younger densely papulose-hispid. *Leaves* acute, ovate, 1—4 cm. long, the lower 1·5—2·5 cm. wide, the upper 0·5—1 cm., narrowed at both ends: petiole 0·2—0·4 cm. long. *Flowers* solitary, axillary, the upper with very small bracts and raceme-like. Pedicels 0·5—1·5 cm. long, densely papulose-hispid, the upper divaricate. *Perianth* segments 4, 3—5 mm. long, broadly ovate, subacute, hairy outside, bright yellow inside. *Stamens* numerous: anthers oblong, dull yellow. *Ovary* densely hispid: styles 3, less often 2. *Fruit* wingless, spherical, 0·5—0·7 cm. diam., densely covered with short spreading semi-rigid scales.

The type is *Bolus* 13558 (BOL).

Sand among bushes.

In general habit and leaf like *T. herbacea* but totally different in inflorescence and fruit.

PIKETBERG. Base of mts. near Piketberg, *Bolus* 13558 (BOL).

Ser. 7. **Chenopodinae** Fenzl in Fl. Cap. 2. 460. 1862.

Herbs papulose or hairy-papulose, usually prostrate. Flowers sessile or nearly so in axillary groups.

The type species is *T. chenopodioides* E. & Z. *emend.* Fenzl.

KEY TO THE SPECIES.

1. Fruit not winged: stamens numerous.
    2. Styles 3—5, twice as long as the perianth: fruit with projecting ridges .. .. *chenopodioides*
    2. Styles 2—3, not exceeding the perianth: fruit with ridges not projecting .. .. *Pillansii*
1. Fruit winged: stamens 5—8: style 1: lower leaves petiolate, the upper sessile .. .. *galenioides*

28. **T. chenopodioides** E. & Z. Enum. 324. 1837. (*p. pte.*). *emend.* Fenzl in Fl. Cap. 2. 463. 1862. *T. macrostylis* Schltr. Bot. Jahrb. 27. 124. 1900.

Herbaceous, flaccid but slightly succulent, papulose. *Stems* up to 40 cm. long, sprawling with erect branches. *Leaves* petiolate, elliptic-oblong, narrowed at both ends, 2—5·5 cm. long, 0·7—1·7 cm. wide. *Flowers* in the upper axils, in groups of 2—5, sessile or on very short pedicels. *Perianth* segments papulose, oblong, obtuse. *Stamens* numerous, yellow or red: anthers short ovoid. *Styles* 3—5, red, about twice as long as the perianth. *Fruit* with 8 distinct projecting ridges but not winged, truncate at the top, 0·6 cm. long and about as wide, usually papulose.

The type is *Ecklon & Zeyher* 2118 (Saldanha Bay) in herb. Sond. (S).

Open sand on the coastal plain in the Saldanha Bay region.

(For notes on the type specimen cf. under *T. portulacoides.*)

CLANWILLIAM Zuurfontein, *Schlechter* 8529 (BM, BOL, GRA, K, PRE, S), (type of *T. macrostylis.*)

HOPEFIELD. Saldanha Bay, *Ecklon & Zeyher* 2118 p. pte. (S): *Zeyher* s.n. (S, SAM): Hopefield, *Compton* 15881 (NBG): *Leighton* 757 (BOL): *Lewis* (SAM): Vredenburg, *Lewis* (SAM).

MALMESBURY. Geelbek. *Barker* 4630 (NBG): Berg River. *Barker* 4054 (NBG).

29. **T. Pillansii** Adamson sp. nov.

Herba papulosa. Folia oblongo-lanceolata basi cuneato-petiolata. Flores axillares sessiles aggregati superiores masculi. Perigonii segmenta papulosissima subacuta. Stamina numerosa. Styli 2—3, raro 4, perigonio breviores. Fructus apterus cylindrico-rotundus truncatus 8-costatus.

A many-stemmed papulose herb gray-green in colour. *Leaves* oblong-lanceolate, narrowed to a distinct petiole: blades 2—3 cm. long, 0·5—0·8 cm. wide: petiole about 2 cm. long. *Flowers* aggregated, sessile, very papulose, the upper male. *Perianth* segments triangular subacute. *Stamens* about 20, the anthers oblong. *Styles* 2—3, rarely 4, longer than the stamens but shorter than the perianth. *Fruit* rotund-cylindrical, truncate, 4—6 mm. long or rarely 8—9 mm., about 4 mm. diam., with 8 longitudinal obtuse ridges, close and not much projecting.

The type is *Adamson* 5020 (BOL).

Open sand in river beds.

Allied to *T. chenopodioides* but distinguished by the crowded flowers, short styles, and the fruit.

NAMAQUALAND. Hondeklip Bay, *Pillans* (BOL): Wallekraal, *Adamson* 5020.

30. **T. galenioides** Fenzl in Fl. Cap. 2. 463. 1862.

A rather coarse yellow-green herb, covered all over with hair-like scales. *Stems* 15—35 cm. long, prostrate with erect or semi-erect branches:

internodes elongated below but short near the tips. *Leaves* ovate or oblong, the lower petiolate, the upper sessile, 2—5 cm. long, 0·8—1·8 cm. wide, rather thick, subobtuse. *Petioles* of the lower leaves as long as the blades. *Flowers* almost sessile, crowded in the upper axils, sometimes forming a spike-like mass. *Perianth* densely covered with hair-like scales, the segments oblong, obtuse. *Stamens* 5—8: anthers linear-oblong. *Style* 1, as long as the perianth. *Fruit* 4-winged, 0·7—1·2 cm. long, 0·4—0·8 cm. wide, rounded at the base, indented at the top, with acute projecting tubercles between the wings. Wings papulose, reticulate when dry.

The lectotype is *Drege* (Blaauwberg) in herb. Sonder (S).

Dry sclerophyll usually on rocks.

A distinctive but rare species. It is quite exceptional in the small number of stamens but in other features clearly associated with this subgenus.

CLANWILLIAM. Blaauwberg, *Drege* (S): Kradouw Krantz, *Pearson* 5325 (BOL, K).

Without locality:—*Drege* 7034a (K).

Sub-gen. 2. **TETRAGONOIDES**

Sub-gen. 2. **TETRAGONOIDES** DC. Prodr. 3. 452. 1828. *Demidovia* (Pall.) O. Kuntze in v. Post & Kuntz Lex. Gen. Phan. 554. 1904. *Pro gen.* Pall. Hort. Demid. 150. t. 1. 1781.

Herbs, usually annual, more or less prostrate. *Flowers* sessile or nearly so, solitary or in groups. *Stamens* as many as and alternate with the perianth segments, or sometimes in pairs, sometimes fewer in number. *Ovary* distinctly projecting above the insertion of the perianth. *Fruit* not winged, often with ridges or projections at the top or sides.

The type species is *T. expansa* Murr.

This subgenus occurs in Australasia, S. America and elsewhere.

The small number of stamens and the incompletely inferior ovary suggest relationships with other genera in the family and that this may be the least specialised of the subgenera.

KEY TO THE SPECIES.

1. Flowers in groups of 3—5 or more.
    2. Flowers sessile: ovary projecting as a cone: fruit with 3—4 flat angular projections at the top .. .. *microptera*
    2. Flowers shortly pedicellate: ovary with 2—3 obtuse projections round the styles: fruit ridged, with spine-like outgrowths on the ridges .. .. *echinata*
1. Flowers solitary or less often in pairs.
    3. Fruit covered all over with spine-like outgrowths .. .. *acanthocarpa*
    3. Fruit without spine-like outgrowths.
        4. Papulose-hairy all over: stamens as many as the perianth segments: fruit ridged .. .. *caesia*
        4. Glabrous-papulose: stamens twice as many as the perianth segments: fruit smooth, with horn-like projections at the top *expansa*

31. **T. echinata** Ait. Hort. Kew. 2. 177. 1789. DC. Hist. Pl. Grass. 2. 113. 1799.

A more or less prostrate many-stemmed papulose slightly succulent annual. *Stems* up to 40 cm. long, with raised decurrent lines from the leaf bases. *Leaves* petiolate, the blades oval, rhombic or deltoid, or occasionally almost orbicular, 1—2·5 cm. long, 0·8—1·75 cm. wide, obtuse; petiole 0·3—0·8 cm. long. *Flowers* small, 2 mm. long, in axillary groups of 2—4, on very short pedicels. *Perianth* densely papulose, the segments 3—5, erect, triangular, obtuse, concave inside. *Stamens* 3—5, alternate with the perianth segments but occasionally paired: anthers oval. *Styles* usually 3, less often 4 or 5, not longer than the stamens. *Ovary* densely papulose, inferior but with 3—5 obtuse projections opposite the perianth segments. *Fruit* papulose, 3—5 mm. long and wide, rounded or partly truncate at the top, with 3—5 projecting ridges each with few or many spine-like outgrowths.

The type is *Masson* "Hort. Kew." (BM).

Open places. A pioneer plant. Sometimes spreading as a roadside weed.

Rather variable in size, leaf-shape and the degree of papulosity. On the fruit the water storage cells may project as much as the spine-like outgrowths.

CALEDON. Caledon, *Adamson* 4573: Sonderende, *Ecklon & Zeyher* 2116 (SAM): *Zeyher* (SAM).

SWELLENDAM. Storms Vlei, *Adamson* 4586: *Ecklon & Zeyher* (SAM): Breede River, *Ecklon & Zeyher* 88.7 (S).

RIVERSDALE. Riversdale, *Muir* 2741 (PRE).

ROBERTSON. Ashton, *Adamson* 4648.

LADISMITH. Little Karroo, *Adamson* 4631.

WORCESTER. Hex River, *Wolley-Dod* 4019 (BOL, K).

LAINGSBURG. Whitehill, *Compton* 2907 (BOL), 10877 (NBG).

PRINCE ALBERT. Prince Albert, *Bolus* 10914 (PRE).

MURRAYSBURG. Murraysburg, *Tyson* 29 (SAM).

GRAAFF-REINET. Graaff-Reinet, *Bolus* 100 (BM, K), 110 (BOL, S): *Ecklon & Zeyher* 88 (S).

CRADOCK. Cradock, *Cooper* 1300 (BM, K): *Henrici* 4569 (PRE): *Kensit* (BOL).

SOMERSET EAST. Somerset East, *Bowker* (K).

UITENHAGE. Enon, *Drege* (S): Uitenhage, *Ecklon* 20 (S): Swartkops River, *Ecklon & Zeyher* 2116 (SAM): *Zeyher* 2627 (S, SAM), s.n. (SAM): Sundays River, *Ecklon* (S).

ALBANY. Grahamstown, *Ecklon* (S): Bothas Hill, *Dyer* 1415 (GRA, PRE): Fish River, *Barker* 19 (K, GRA): Bathurst Valley, *Britten* 5426 (GRA).

FORT BEAUFORT. Fort Beaufort, *J. S. Taylor* (GRA): Lower Blinkwater, *Story* 1704 (PRE).

Without locality:—*Drege* 7028 (BM, K): "*G.K.*" (S): "Hort. Kew." (*Masson*) (BM): "*W.M.*" (S).

32. **T. microptera** Fenzl in Fl. Cap. 2. 461. 1862.

A prostrate much branched slightly succulent annual. *Stems* up to 50 cm. long, usually papulose. *Leaves* petiolate, glistening papulose the blades broadly ovate or orbicular, 0·5—2 cm. long, 0·5—1·8 cm. wide, obtuse: petioles 0·4—1·2 cm. long. *Flowers* 1—1·5 mm. long, axillary, sessile, in groups of 2—5. *Perianth* very papulose, the segments 3—4, triangular, subacute, slightly concave inside. *Stamens* usually as many as and alternate with the perianth, sometimes fewer: anthers small, oval. *Ovary* projecting as a cone almost as long as the perianth. *Styles* 2—3, very short. *Fruit* papulose, obpyramidal, rounded at the base, truncate at the top, 2—4 mm. long and wide, with 3—4 projecting ridges forming flat triangular extensions at the top.

The type is *Drege* 2932 in herb. Vienna, lectotype *Drege* (Ebenezer) in herb. Sonder. (S).

A pioneer on open soil in arid regions, also as a roadside weed elsewhere.

Like *T. echinata* but distinguished by the broader leaves, sessile flowers, less inferior ovary, and the fruit without spine-like out-growths. The fruit may have large papillae and such forms are apt to be confused with *T. echinata*. Var. *monosperma* Fenzl l.c. seems to be merely a depauperate state. The plants distributed by Dinter (3905) under the name "*T. cynocrambe*" appear to be this species.

S.W.A. Luderitz, *Kinges* 2688 (PRE): Klinghardtberg, *Dinter* 3905 (BOL, PRE): Haarlemberg, *Pearson* 5890 (BOL).

NAMAQUALAND. Groot Derm, *Pillans* 5243, 5383 (BOL): Arris Drift, *Pillans* 5242 (K): Steinkopf, *Schlechter* 1875 (BM, GRA, SAM): O'okiep, *Bolus* 9535 (BOL, K): Brakfontein, *Pillans* 5570 (BOL): Hesses River, *Pillans* (BOL): Nieuwekloof, *Schlechter* 9044 (BM, BOL): Bitterfontein, *Zeyher* 116 (S), 716 (BOL, K, SAM).

CALVINIA. Loeriesfontein, *Pearson* 4845 (K): Blaauwkrantz, *Adamson* 4553.

KENHARDT. Tantelboskalk, *Adamson* 2089.

VAN RHYNSDORP. Ebenezer, *Drege* (S): nr. Nieuwerust, *Adamson* 4536, 4973, 4975, 4979.

CLANWILLIAM. Lamberts Bay, *Adamson* 4512: Farrs River, *Schlechter* 8097 (BM, BOL, GRA, K, S, PRE): Grays Pass, *Schlechter* 10762 (BM, BOL, K, PRE, S).

CERES. Karroo Poort, *Wall* (S).

SUTHERLAND. Verlaten Kloof, *Hafstrom & Acock* 441 (PRE, S), 444 (S).

WORCESTER. Hex River, *Malleson* 11220 (NBG), s.n. (BOL): Veld Reserve, *van Breda* 47 (PRE).

LAINGSBURG. Whitehill, *Compton* 3253 (BOL).

PRINCE ALBERT. Prince Albert, *Bolus* (BOL).

STELLENBOSCH. Strand. *Parker* 3510 (BOL. K. NBG): Brakenfel. *Acock* 2134 (S).

CAPE. Strandfontein, *Acock* 677 (S): Retreat, *Schlechter* (BOL).

CALEDON. Gansbaai, *Compton* 18231 (NBG).

SWELLENDAM. Port Beaufort, *Adamson* 4608.

LADISMITH. Ladismith, *Adamson* 4629.

GRAAFF-REINET. Graaff-Reinet, *Bolus* (GRA).

PEARSTON. Pearston, *Palmer* (BOL).

KNYSNA. Groot River, *Muir* 4275 (PRE).

ALBANY. Grahamstown, *Ecklon* (S).

Without locality:—*Drege* 7026 (K), (*T. decumbens* b) (BM, K): *Prior* (K).

Var. **platycarpa** Adamson var. nov.

A typo differt fructibus majoribus subcompressis carinis lateralibus ceteris multo latioribus.

Larger than the typical plant. *Fruit* 0·5—0·8 cm. long and wide, compressed, with two large lateral ridges much wider and more extended than the three small obtuse ones on each face.

TULBAGH. Tulbagh Waterfall, *Herre* (BOL) (type).

33. **T. acanthocarpa** Adamson sp. nov.

T. echinatae affinis sed differt foliis minoribus, floribus solitariis, fructibus cylindrico-sphaericis non carinatis spinis acutis numerosis obtectis.

Prostrate herb with *stems* 10—25 cm. long. *Leaves* elliptical or rhombic, rather thick, papulose: blades 0·5—1 cm. long, 0·4—0·7 cm. wide: petioles 0·4—0·7 cm. long. *Flowers* axillary, solitary, on pedicels 0·1—0·3 cm. long. *Perianth* segments 4, connate at the base, rather thin, erect, obtuse, broadly triangular. *Stamens* 4, alternate with and shorter than the perianth segments: anthers rounded. *Ovary* inferior, coarsely papulose, bulging as a flattened cone above the insertion of the perianth: *styles*, 3, rarely 2 or 4. Fruit 0·4—0·5 cm. long, 0·3 cm. diam., truncate at the base, not ridged, covered all over with rigid spines 1—1·5 mm. long. Both fruit and spines papulose. The fruiting pedicel may be up to 0·6 cm. long.

The type is *Gill* 206 (BOL).

Open ground in the central Karroo.

Like *T. echinata* but with solitary flowers, and much larger spine-covered fruit with no ridges.

C.G.H.

MIDDELBURG. Grootfontein, *Gill* 206 (BOL): *Theron* 751 (K, PRE).

HANOVER. Hanover, *Henrici* 3928 (PRE).

SOMERSET EAST. Somerset East, *Acocks* 12017 (PRE).

O.F.S.

FAURESMITH. Fauresmith, *Henrici* 3037 (PRE).

A specimen from Kenya (*Bogden* 3400 (K)) may be this species.

34. **T. caesia** Adamson sp. nov.

Herba dense papulosa ramosa. Folia petiolata. Flores axillares saepissime solitarii breviter pedicellati. Styli 2. Fructus apice truncatus 4-carinatus carinis obtusis apice haud dilatatis, spinis nullis.

A densely papulose herb with many prostrate *stems* up to 40 cm. long. Stems much branched, covered with glistening papillae and some transparent scales. *Leaves* dark green when fresh but gray-green when dry, semi-succulent, petiolate: blades deltoid, rhombic or ovate, 0·5—3 cm. long, 0·5—2 cm. wide: petioles as long as the blades. *Flowers* most often solitary, on pedicels 1—6 mm. long. *Perianth* segments 4, densely papulose outside, about 1 mm. long, obtuse, hooded, with a tuft of scales at the tip. *Stamens* 4—6, commonly 5: anthers rounded. *Ovary* swollen, densely papulose, 4-ridged, projecting as a cone half as long as the perianth. *Styles* 2, very short. *Fruit* barrel-shaped, about 3 mm. long, 2·5 mm. diam., truncate at the ends, slightly narrowed to the base, with 4, less often 3, obtuse ridges not widened at the top and without spines or projections.

The type is *Adamson* 4569 (BOL).

Open sand where moist in spring.

Like *T. microptera* but more succulent, with solitary flowers, and quite different fruit.

CAPE. Cape Flats near Swartklip, *Adamson* 4569.

35. **T. expansa** Murr. Comm. Goet. 6. 13. t. 5. 1783. *T. tetragonoides* (Pall.) O. Kuntze Rev. Gen. 2. 264. 1891.

A large prostrate somewhat succulent annual with stout stems 1—2 m. long. *Leaves* rhombic, deltoid or rhombic-oval, up to 8 cm. long and 4 cm. wide, obtuse, petiolate. *Flowers* solitary or in pairs, axillary, sessile. *Perianth* segments 5. *Stamens* about 10: anthers rotund. *Styles* 5—8.

Ovary not completely inferior, the top forming a cone as long as the perianth. *Fruit* smooth, conical or top-shaped, 0·5—1 cm. long, 0·4—0·7 cm. diam., with 4 short hard horn-like projections at the top.

A native of New Zealand often cultivated and occurring locally as a casual. It is not persistent and shows no sign of becoming established.

NATAL. Isipingo, *Moss* 3218 (BM): *Forbes & Obermeyer* 3646 (SAM).

TRANSVAAL. Milner Park, Johannesburg, *Moss* 6654 (BM).

ANGOLA. Loanda, *Welwitsch* 2378 (BM).

Sub-gen. 3. **ANISOSTIGMA**

Sub-gen. 3. **ANISOSTIGMA** (Schinz) Engler Pflanzw. Afrik. 3. 148. 1915. *Anisostigma* Schinz Bull. Herb. Boiss. 5. App. 3. 78. 1897. (*pro gen.*).

Tall shrubs. *Leaves* glaucous, glabrous. *Flowers* in cymose panicles. *Perianth* segments 5, distinctly connate. *Stamens* 5, alternate with the perianth segments. *Ovary* 1-locular with 1 ovule: *styles* 4, two long and 2 short. *Fruit* 3-winged.

Only species *T. Schenckii.*

36. **T. Schenckii** (Schinz) Engler l.c. *Anisostigma Schenckii* Schinz l.c.

A glabrous erect woody shrub 0·5—1·5 m. high. *Stems* stout, with few ascending branches but many short herbaceous branches at the tip. *Leaves* leathery, rather thick, ascending, oblong, obovate or spatulate, obtuse, cuneate at the base to a short petiole. Leaves variable in size, 1—4 cm. long, 0·3—1·5 cm. wide. *Flowers* small, numerous, in cymose panicles at the tips of the short branches. *Perianth* segments 5, obtuse, white-edged, 1·5 mm. long. *Stamens* 5. *Styles* 4, two as long as the perianth, two very short. *Fruit* brown, narrowed to the base, 0·5—1 cm. long, 0·3—0·6 cm. wide, with 3 dry brown wings.

The type is *Schinz* 2 (Z).

Dry river beds, usually sandy, in arid regions.

S.W.A. Gt. Fish River, *Acocks* 15564 (K, PRE): *Pearson* 9806 (BOL, K). 9333 (BOL. K): Changab River. *Pillans* 6555 (BOL. K): Lowens River. *Pearson* 4084 (BOL, K): Leben River, *Pearson* 9258 (BOL, K): Keetmanshoop. *Ortendahl* (BOL. K. PRE): Bethanien. *Marloth* 5030 (BOL): Sabiesis, *Pearson* 4578 (SAM): Ainbaas, *Pearson* 9246 (BOL, K): Damaraland, *Keet* 164 (K, PRE): *Schenck* 371 (K).

Sub-gen. 4. **TRIBULOCARPUS**

Sub-gen. 4. **TRIBULOCARPUS** Adamson comb. nov. *Tribulocarpus* S. Moore Journ. Bot. 59. 228. 1921 (*pro gen.*).

Glabrous herbs. *Flowers* in terminal umbel-like groups surrounded by bracts, the outer flowers stalked, the inner almost or quite sessile. Stalked flowers and some of the sessile male. *Perianth* in the bisexual flowers with an elongated tube and 5 spreading lobes, in the male flowers the segments almost free. *Stamens* numerous. *Ovary* 2-locular, *styles* 2. *Fruit* compound, large, covered with stout spreading spines probably representing bracts.

Only species *T. dimorphantha* Pax.

37. **T. dimorphantha** Pax Bot. Jahrb. 11. 12. t. 2. 1889. *Tribulocarpus dimorphanthus* (Pax) S. Moore l.c.

Herbaceous but woody at the base, glaucous, 20—50 cm. high. Young parts papulose-powdery. *Leaves* ovate-spathulate, 1—4 cm. long, 1—1·5 cm. wide, cuneate at the base, obtuse or mucronate at the tip: petioles about as long as the blades. *Flowers* in terminal bracteate groups, the central flowers sessile, the outer pedicellate. Outer flowers male, on rough pedicels 1—1·5 cm. long, the inner male and bisexual. *Perianth* segments 5, 4—8 mm. long, in male flowers rotate and almost free, in bisexual flowers with a narrow tube 3—5 mm. long and small spreading lobes. *Fruit* stalked, subspherical, 0·5—2 cm. diam., covered all over with stout conical or flat spines 3—5 mm. long.

The type is *Marloth* 1249 in herb. Berlin: lectotype in PRE.

Sandy river beds in S.W. Africa.

S.W.A. Luderitz, *Schinz* 159 (K): Walvis Bay, *Rogers* 15313 (K): Usakos, *Marloth* 1249 (PRE): Ababis, *Engler* 6142 (K): Karibib, *Dinter* 6902 (BOL, BM, K).

NAMAQUALAND. O'okiep, *Scully* (K).

INDEX OF NUMBERED SPECIMENS.

ACOCKS. 260 *herbacea*; 552 *nigrescens*; 675 *fruticosa*; 677 *microptera*; 785 *spicata*; 935 *spicata*; 1575 *arbuscula*; 1603 *erecta*; 1660-1 *arbuscula*; 2134 *microptera*; 2350 *spicata*; 2358 *arbuscula*; 2601 *herbacea*; 4123-4 *arbuscula*; 4737 *nigrescens*; 11917 *arbuscula*; 12017 *acanthocarpa*; 14276 *arbusculoides*; 14360 *arbuscula*; 14378 *reduplicata*; 14440 *robusta*; 14525 *herbacea*; 14837 *hirsuta*; 14949 *spicata*; 14966 *spicata*; 15015 *verrucosa*; 15074 *arbuscula*; 15098 *glauca*; 15199 *rosea*; 15219 *fruticosa*; 15564 *Schenckii*; 15874 *arbuscula*; 15882 *arbuscula*; 16003 *fruticosa*; 16363 *arbuscula*; 17082 *hirsuta*; 17323 *virgata*; 17341 *saligna*.

ADAMSON. 933 *portulacoides*; 962 *fruticosa*; 1826 *decumbens*; 1857 *herbacea*; 2089 *microptera*; 2183 *fruticosa*; 2526, 2539 *herbacea*; 2584 *spicata*; 2914 *portulacoides*; 3323 *decumbens*; 3710 *decumbens*; 4131 *robusta*; 4471 *rosea*; 4475-6 *spicata*; 4477 *halimoides*; 4487 *rosea*; 4488 *hirsuta*; 4490 *saligna*; 4492 *spicata*; 4500 *saligna* v. *extrusa*; 4505, 4507 *nigrescens*; 4512 *microptera*; 4519 *rosea*; 4522 *nigrescens*; 4527 *spicata*; 4529 *macroptera*; 4530 *spicata*; 4536 *microptera*; 4539 *hirsuta*; 4550 *halimoides* v. *procumbens*; 4553 *macroptera*; 4557 *sarcophylla*; 4559 *sarcophylla* v. *psiloptera*; 4560 *sarcophylla*; 4569 *caesia*; 4563 *echinata*; 4586 *echinata*; 4587 *sarcophylla*; 4591 *lasiantha*; 4592-3 *sarcophylla*; 4596 *verrucosa*; 4599 *sarcophylla*; 4602 *sarcophylla*; 4605 *sarcophylla*; 4608 *microptera*; 4610 *spicata*; 4619-20 *robusta*; 4629 *microptera*; 4630 *spicata* v. *laxa*; 4631 *echinata*; 4641, 4643 *spicata* v. *laxa*; 4648 *echinata*; 4649 *verrucosa*; 4653 *lasiantha*; 4656 *saligna*; 4660 *saligna*; 4671-2, 4674 *fruticosa*; 4676 *spicata*; 4692 *spicata*; 4700, 4702-3 *fruticosa*; 4729 *saligna*; 4731, 4733 *sarcophylla* v. *psiloptera*; 4738, 4741 *decumbens*; 4828 *erecta*; 4829 *saligna* v. *latifolia*; 4932 *herbacea*; 4935-7 *spicata*; 4939 *herbacea*; 4947 *spicata*; 4955 *rosea*; 4964-5 *nigrescens*; 4966 *spicata*; 4967 *glauca*; 4971 *fruticosa*; 4972 *sarcophylla* v. *psiloptera*; 4973, 4975, 4979 *macroptera*; 4981-2 *robusta*; 4983 *verrucosa*; 4984 *robusta*; 4992-3 *macroptera*; 4998 *saligna* v. *latifolia*; 5001 *calycina*; 5011, 5018 *virgata*; 5020 *Pillansii*; 5024 *virgata*; 5056 *glauca*; 5060 *nigrescens*; 5069 *nigrescens*; 5072 *saligna* v. *extrusa*; 7053 *aff. nigrescens*; 5081 *robusta*; 5089 *sarcophylla* 5093-4 *saligna*; 5105 *verrucosa*; 5108 *robusta*; 5113 *saligna*; 5115 *lasiantha*; 5116 *verrucosa*; 5117 *sarcophylla*; 5118 *verrucosa*; 5119 *distorta*; 5132, 5139 *verrucosa*; 5140 *sarcophylla*; 5144 *verrucosa*; 5145 *Haworthii*?; 5150 *robusta*; 5153 *saligna*; 5155 *verrucosa*; 5156 *robusta*; 5163-5 *glauca*; 5166 *fruticosa*; 5252 *arbuscula*; 5254 *fruticosa*; 5255 *decumbens*; 5256-8 *fruticosa*; 5281 *fruticosa*.

ANDREAE. 445 *rosea*; 462 *calycina*; 95 *fruticosa*.

BARKER. 19 *echinata*; 2322 *decumbens*; 2584 *hirsuta*; 4054 *chenopodioides*; 4630 *chenopodioides*; 4637 *portulacoides*; 4669 *spicata*; 5384 *sarcophylla*; 5492 *spicata*; 5806 *namaquensis*; 5772 *hirsuta*; 5923 *verrucosa*; 5924 *spicata*; 6191 *rosea*; 6873 *nigrescens*.

BACHMANN. 1965 *portulacoides*?.

BAUR. 1177 *herbacea*.

BENNIE. 308 *decumbens*; 680 *arbuscula*.

BOGDEN. 3400 ? *acanthocarpa*.

BOLUS. 100, 110 *echinata*; 107 *arbuscula* & *spicata*; 365 *glauca*; 844 *arbuscula*; 1870 *fruticosa*; 1867 *fruticosa*; 2313 *saligna*; 3841 *fruticosa*; 4027 *herbacea*; 5300 *nigrescens*; 7542-3 *nigrescens*; 8992 *saligna*; 8993 *rosea*; 9534 *spicata*; 9535 *microptera*; 9961 *nigrescens*; 11513 *spicata* & *verrucosa*; 11912 *robusta*; 11913 *arbuscula*; 11914 *echinata*; 12694 *nigrescens*; 12695 *herbacea*; 12696 *spicata*; 12697 *fruticosa*; 13557 *hirsuta*; 13558 *sphaerocarpa*.

BOND. 552 *saligna*; 761 *fruticosa*; 1072 *nigrescens*; 1073 *virgata*; 1076 *rosea*; 1134 *sarcophylla*.

BRADFIELD. 483 *arbuscula*.

BRITTEN. 55 *fruticosa*; 674 *decumbens*; 5426 *echinata*.

BROCK. 21 *fruticosa*.

BRYANT. 213 *arbuscula*; 317 *arbuscula*; J 317 *arbusculoides*; 510 *arbuscula*; 1185 *arbuscula*.

BURCHELL. 319 *fruticosa*; 687 *fruticosa*; 970 *portulacoides*; 982 *herbacea*; 1577 *decumbens*; 2070 *macroptera*.

CODD. 3555, 3575 *fruticosa*; 3571 *decumbens*; 5788 *arbuscula*.

COMPTON. 2826 *sacrophylla;* 2899 *fruticosa;* 2907 *echinata;* 2920 *robusta;* 3231 *sarcophylla;* 3253 *microptera;* 3460 *spicata;* 3607 *saligna* v. *latifolia;* 4282 *rosea;* 4326 *nigrescens;* 4721 *sarcophylla;* 5381 *nigrescens;* 5307 *glauca;* 6848 *nigrescens;* 6884 *spicata;* 7489 *glauca;* 7778 *robusta;* 7804 *nigrescens;* 8750 *robusta;* 8894 *herbacea;* 9330 *fruticosa;* 9838 *fruticosa;* 9867 *fruticosa*; 10877 *echinata;* 10897 *fruticosa;* 10903 *nigrescens;* 10911 *herbacea;* 10920 *herbacea;* 10975 *spicata;* 11462 *spicata* v. *laxa;* 12301 *fruticosa;* 13445 *spicata;* 14326 *fruticosa;* 14332 *decumbens;* 14908 *sarcophylla;* 14910 *spicata;* 15005 *herbacea;* 15048 *namaquensis;* 15092 *hirsuta;* 15171 *robusta;* 15183 *spicata* v. *laxa;* 15867 *portulacoides;* 15881 *chenopodioides;* 18231 *microptera;* 19506 *herbacea;* 19886 *spicata;* 20020 *rosea;* 20039 *hirsuta;* 20520 *robusta;* 20611 *virgata;* 20691 *rosea;* 20721, 20765 *rosea;* 20856 *spicata;* 20863 *virgata;* 20906 *hirsuta;* 20963 *rosea;* 23044 *saligna;* 23066 *fruticosa;* 23662 *fruticosa.*

COOPER. 488 *arbuscula;* 566 *arbuscula;* 1300 *echinata.*

CROSS. 35 *portulacoides.*

CRUDEN. 402 *fruticosa;* 480 *fruticosa;* 481 *decumbens.*

DINTER. 375 *spicata;* 379 *calycina;* 3548 *arbusculoides;* 3905 *microptera;* 4922 *arbuscula;* 6092 *arbuscula;* 6530 *spicata;* 6902 *dimorphantha.*

DREGE. 2932 *microptera;* 7026 *microptera;* 7028 *echinata;* 7030 *glauca;* 7031 *verrucosa;* 7034a *galenioides;* 7040 *arbuscula;* 7043 *spicata;* 7044 *distorta;* 7045 *fruticosa;* 7046 *spicata;* 7049 *virgata;* 7050 *namaquensis;* 7070 *glauca;* 8018 *sarcophylla.*

J. L. DREGE. 57 *spicata;* 302 *spicata;* 344 *fruticosa;* 452 *spicata;*

DYER. 617 *fruticosa;* 1036a *arbuscula;* 1415 *echinata;* 1579 *sarcophylla;* 2017 *decumbens;* 2117 *robusta;* 3017 *decumbens.*

ECKLON. 19 *nigrescens;* 20 *echinata;* 62·11 *fruticosa;* 138 *decumbens;* 789 *fruticosa;* 2117, 2119 *nigrescens;* 2121 *saligna* v. *latifolia.*

ECKLON & ZEYHER. 68 *halimoides;* 76·7 *nigrescens;* 87 *halimoides;* 88 *echinata;* 99 *glauca;* 2115 *herbacea;* 2116 *echinata;* 2118 *chenopodioides & portulacoides;* 2120 *hirsuta;* 2121 *spicata;* 2122 *spicata;* 2123 *glauca;* 2124 *fruticosa;* 2128 *decumbens;* 2130 *hirsuta.*

EDWARDS. 167 *hirsuta.*

ENGLER. 6041 *arbusculoides;* 6142 *dimorphantha.*

ESTERHUYSEN. 2322 *arbuscula;* 2974 *nigrescens;* 3055 *nigrescens;* 5000 *nigrescens;* 5079 *spicata;* 5599 *hirsuta;* 5679 *virgata;* 5738 *spicata;* 10280 *portulacoides;* 16016 *portulacoides;* 18983 *fruticosa;* 20126 *herbacea;* 21585 *spicata.*

FAIRALL. 175 *fruticosa.*

FLANAGAN. 616 *decumbens.*

FOLEY. 129 *spicata.*

FOURCADE. 85 *fruticosa;* 1064 *fruticosa;* 1075 *fruticosa;* 1463 *decumbens;* 1977 *decumbens;* 4375 *sarcophylla;* 4737 *spiczta;* 5752 *fruticosa.*

FRIES, NORLINDH & WEIMARCK. 550 *spicata.*

GALPIN. 313 *decumbens;* 2968 *fruticosa;* 4069 *erecta;* 4068 *saligna;* 4070 *fruticosa;* 5649 *arbuscula;* 11341 *decumbens;* 11498 *fruticosa;* 11507 *rosea;* 14207 *reduplicata.*

GALPIN & PEARSON. 7505 *reduplicata;* 7585 *arbusculoides;* 7591 *arbusculoides.*

GARSIDE. 295 *herbacea;* 615 *fruticosa.*

GERSTNER. 6139 *decumbens.*

GILL. 116 *arbuscula;* 206 *acanthocarpa.*

GILLETT. 3104 *fruticosa;* 3614 *nigrescens;* 3697 *nigrescens;* 4042 *rosea;* 4418 *portulacoides.*

GODMAN. 546 *hirsuta;* 584 *rosea;* 741 *namaquensis.*

GOSSWEILER. 11350 *reduplicata.*

GUTHRIE. 605 *herbacea;* 936 *portulacoides;* 1206 *spicata;* 2609 *hirsula;* 2610 *spicata;* 4816 *rosea.*

HAFSTROM & ACOCK. 438 *nigrescens;* 439 *hirsuta;* 440 *saligna;* 441, 444 *microptera.*

HALL. 123 *rosea;* 131 *sarcophylla.*

HARVEY. 493 *fruticosa.*

HENDERSON. 1144 *spicata.*

HENRICI. 2074 *arbuscula;* 2109 *rosea;* 3037 *acanthocarpa;* 3366 *robusta* v. *psiloptera;* 3396 *sarcophylla;* 3459 *rosea;* 3469 *rosea;* 3470 *spicata;* 3471 *robusta* v. *psiloptera;* 3928 *acanthocarpa;* 4366 *arbuscula;* 4569 *echinata.*

HILNER. 454 *decumbens.*

HOLLAND. 3765 *decumbens.*
HOWES. 186 *saligna.*
HUTCHINSON. 191 *herbacea;* 196 *spicata;* 215 *nigrescens.*
JOHNSON. 183 *rosea;* 192 *fruticosa;* 199 *calycina;* 239 *rosea.*
KEET. 5 *spicata;* 651 *fruticosa;* 1664 *Schenckii.*
KIES. 50 *herbacea.*
KINGES. 2337 *arbusculoides;* 2636 *verrucosa;* 2688 *microptera.*
KOTZE. 79 *arbuscula;* 837 *arbuscula.*
LEIGHTON. 757 *chenopodioides;* 1032 *sarcophylla;* 1234 *nigrescens.*
LEIPOLDT. 365 *spicata;* 876 *rosea;* 4016 *arbuscula;* 4017 *hirsuta & nigrescens;* 4019 *hirsuta;* 4020 *nigrescens;* 4021 *spicata.*
LETTY. 78 *spicata.*
LEVYNS. 1510 *herbacea;* 1108 *nigrescens:* 1236 *hirsuta:* 5784 *herbacea;* 7883 *decumbens;* 8575 *portulacoides.*
LIEBENBURG. 4529 *macroptera;* 5119 *arbuscula.*
LONG. 221 *decumbens;* 456, 797 *fruticosa;* 1308 *sarcophylla.*
MacGILLIVRAY. 145, 597 *fruticosa.*
MacGREGOR. 205 *rosea.*
MacOWAN. 478 *portulacoides;* 1876 *fruticosa;* 3388 *herbacea;* 9786 *spicata.*
MAGUIRE. 100 *nigrescens;* 122 *rosea;* 204 *namaquensis;* 216 *portulacoides;* 224 *sarcophylla;* 226 *sarcophylla;* 259 *rosea;* 406 *verrucosa;* 931 *hirsuta;* 1351 *macroptera;* 1849 *rosea;* 1851 *sarcophylla;* 1881 *saligna.*
MALLESON. 11220 *microptera.*
MARLOTH. 100 *portulacoides;* 1249 *dimorphantha;* 1427 *macroptera;* 1595 *fruticosa;* 2121 *spicata;* 4027 *portulacoides;* 4268 *fruticosa;* 4791 *arbusculoides;* 5030 *Schenckii;* 5088 *arbusculoides;* 6617 *fruticosa;* 6691 *decumbens;* 6692 *fruticosa;* 6694 *fruticosa;* 8228 *fruticosa.*
MAUDE. 88 *decumbens.*
MICHELL. 6 *fruticosa.*
MORRIS. 151 *verrucosa.*
MOSS. 3218 *expansa;* 3271 *decumbens;* 3272 *fruticosa;* 4249 *fruticosa;* 11658 *reduplicata;* 17898 *reduplicata;* 17926 *fruticosa;* 17980 *marcoptera;* 18177 *decumbens.*
MUIR. 1632 *portulacoides;* 2644 *fruticosa;* 2741 *echinata;* 3749 *saligna;* 4275 *microptera;* 5098 *fruticosa.*
MUSKETT. 2049 *arbuscula.*
NANNI. 85 *decumbens.*
OLDENBURG. 673 *fruticosa.*
ORTENDAHL. 159 *Schenckii;* 171, 258 *macroptera.*
PAGE. 57 *spicata.*
PARKER. 3510 *microptera;* 3532 *fruticosa.*
PATERSON. 65a *fruticosa;* 617 *decumbens.*
PEARSON. 533 *reduplicata;* 1743 *reduplicata;* 3263 *robusta;* 3274 *glauca;* 4084 *Schenckii;* 4251, 4314 *arbuscula;* 4337 *Schenckii;* 4578 *Schenckii;* 4772 *arbuscula;* 4775 *arbuscula;* 4845 *microptera;* 5325 *galenioides;* 5331 *glauca;* 5531 *glauca;* 5890 *microptera;* 6784 *namaquensis;* 6807 *nigrescens;* 7525 *arbusculoides;* 7783 *hirsuta;* 8672 *arbuscula;* 9246 *Schenckii;* 9258 *Schenckii;* 9333 *Schenckii;* 9457 *arbuscula;* 9525 *arbuscula;* 9806 *Schenckii.*
PEGLER. 1314 *decumbens.*
PENFOLD. 230 *fruticosa.*
PHILLIPS, E. P. 1631 *decumbens;* 3382 *decumbens;* 7244 *nigrescens;* 7500 *sarcophylla* v. *saxatilis.*
PHILLIPS, J. 9 *fruticosa.*
PILLANS. 5242 *microptera;* 5243 *microptera;* 5314 *arbusculoides;* 5383 *microptera;* 5570 *microptera;* 5981 *decumbens;* 6555 *Schenckii;* 7900 *hirsuta;* 8992 *herbacea;* 9044 *microptera.*
POLE-EVANS. 1 *fruticosa;* 17 *macroptera;* 19 *fruticosa;* 2134 *virgata;* 2266 *arbuscula;* 2282 *arbuscula;* 4393 *decumbens.*
POTTS. 309 *fruticosa.*
RANGE. 2 *Rangeana.*
RATTRAY. 1272 *decumbens.*
REHMANN. 414 *fruticosa.*

ROGERS. 1056 *fruticosa;* 4244 *fruticosa;* 4251 *decumbens;* 15313 *dimorphantha;* 16771 *verrucosa;* 18321 *decumbens;* 28065 *decumbens.*
SALISBURY. 43 *decumbens.*
SALTER. 270/9 *portulacoides;* 270/10 *decumbens;* 270/12 *fruticosa;* 270/13 *herbacea;* 963 *sarcophylla;* 7557 *hirsuta;* 8216 *herbacea.*
SCHENCK. 371 *Schenckii.*
SCHINZ. 159 *Schenckii.*
SCHLECHTER. 1259 *portulacoides;* 1875 *microptera;* 4897, 4899 *hirsuta;* 5043 *hirsuta;* 5172 *fruticosa;* 5326 *spicata;* 7189 *herbacea;* 7889 *herbacea;* 7993 *rosea;* 8034 *nigrescens;* 8082 *sarcophylla;* 8097 *microptera;* 8122 *fruticosa;* 8184 *namaquensis;* 8255 *virgata;* 8505, 8515 *saligna;* 8529 *chenopodioides;* 9044 *microptera;* 10762 *microptera;* 18122 *fruticosa.*
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SCHONLAND. 1533 *decumbens.*
SCHWEICKERDT. 1182 *arbuscula.*
SCULLY. 58 *spicata.*
SMITH, C. A. 2395 *arbuscula;* 2814 *arbuscula;* 3899 *arbuscula;* 3905 *arbuscula;* 4500, 4521 *arbuscula;* 5320, 5325 *arbuscula;* 5588, 5594 *arbuscula.*
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STORY. 11 *arbuscula;* 1704 *echinata;* 2883 *spicata;* 2963 *rosea;* 2996 *nigrescens.*
TAYLOR, L. E. 2702 *arbuscula.*
THERON. 128 *arbuscula;* 576 *decumbens;* 751 *acanthocarpa;* 1297 *spicata.*
THODE. A1999 *rosea.*
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THE SOUTH AFRICAN SPECIES OF *LIGHTFOOTIA*.

By R. S. Adamson.

Lightfootia is a genus which is confined to Africa, belonging to Campanulaceae allied to *Wahlenbergia*. About 65 species have been described which are found in South and Central Africa and in Madagascar.

The species fall into two rather distinct groups, the one characterised by a shrubby habit and small often ericoid leaves, the other herbaceous and often annual, with larger and thinner leaves. These two groups show little geographical overlapping. The shrubby species are almost confined to the south, very few occurring north of S.W. Africa or S. Rhodesia. The herbaceous group is found in Central Africa, the few species that extend south into the Union are confined to the east coast. The present account deals only with those species occurring within the Union of South Africa.

Within the Union the greatest concentration of species is in the winter-rainfall area of the south-west of the Cape Province. The genus is, however, far from confined to this region, it extends all along the southern coastal belt and there are species in the summer rainfall areas both on the coast and on the high veld. A few species extend into the arid regions of the karroo though there are none in the driest parts.

The South African species were last revised in 1865 by Sonder for Flora Capensis (3. 554.) who at that time recognised 25 species. A certain number of species have been described since but no general revision has been attempted. In this account the number of species accepted is raised to 46 of which 13 are described for the first time. In addition 11 varieties are recognised of which 8 are new. While not all the species recognised by Sonder or by later workers have been upheld, the increased number is due to more intensive collecting and especially to collecting in the summer months. With few exceptions the plants flower between December and March and when not in flower are inconspicuous and very easily overlooked. Further, increased collecting and the resulting larger quantities of material available has made possible the segregation of species hitherto treated as group species. A notable example is that referred to as "*L. tenella* A.DC." which has been resolved into a number of separate units.

In the present study fresh material has been examined wherever possible. In addition, material in the following herbaria has been examined:—

Bolus Herbarium, University of Cape Town	BOL
Guthrie Herbarium, University of Cape Town	CT
South African Museum, Cape Town	SAM
National Herbarium, Pretoria	PRE
National Botanic Gardens, Kirstenbosch	NBG
Royal Botanic Gardens, Kew	K
British Museum (Nat. Hist.), London	BM
Botany School, Cambridge	CGE
Conservatoire de Botanique, Geneva	G
Naturhistorika Riksmuseum, Stockholm	S

In addition, the specimens in the Linnean herbarium, London, have been consulted, and information and photographs supplied from the Thunberg herbarium in Uppsala.

To the directors and curators of these institutions sincere thanks are expressed for the facilities afforded for study in the institutions or for the loan of specimens.

Type specimens of new species, unless otherwise stated, have been deposited in the Bolus Herbarium, Cape Town.

LIGHTFOOTIA.

L'Herit. Sert. Ang. 3. t. 14. 1788.

Herbs or more often shrublets, perennial or annual. Leaves alternate or less often opposite, simple, very often toothed. Inflorescence cymose, commonly paniculate, the flowers sessile or pedicellate. Flowers small, 5- or 4-merous. Calyx with persistent lobes more or less enlarged at the fruiting stage. Corolla 5- or 4-partite, the lobes longer than wide and usually narrow and parallel-sided, the tube varying from very short to about as long as the lobes. Stamens free from the corolla, the anthers narrow, the filaments widened and usually ciliate at the base. Disc annular. Style simple, as long as or longer than the corolla: stigma 5-, 4-, 3- or 2-fid. Ovary ranging from almost or quite superior to half or more inferior, 5-, 4-, 3- or 2-chambered. Placentation axile with numerous ovules. Fruit a capsule opening at the top by as many valves as there are chambers in the ovary. Seeds small.

The type species is *L. parvifolia* (Berg.) Adamson (*L. oxycoccoides* L'Herit.).

The flowers are distinctly protandrous. The genus is very closely allied to *Wahlenbergia* Schrad. Cat. Hort. Goett. 1814 (*Nom. cons.*) and a clear line of separation between them is not always easy to draw. The main differentiating features are that *Lightfootia* has a more deeply cleft corolla with the lobes longer than wide and at least as long as the tube, a style as long as or longer than the corolla, and in many species a shrubby habit and small leaves. Sonder looked upon angular seeds as distinctive, but this does not hold for all the species. While no one of these features is diagnostic by itself, taken together they do separate a coherent and apparently natural group. Von Brehmer (Bot. Jahrb. 53. 12. 1915) discusses the relationships of the two genera and brings forward arguments for maintaining them which need not be repeated. He considered that *Lightfootia* was a derivative from the stock that gave rise to *Wahlenbergia* and that separation had occurred early in the history.

A. De Candolle (Ann. Sci. Nat. 5. 6. 326. 1866) suggested a sub-division into two subgenera, *Mesotheca* in which the ovary is 3 or more chambered and at least partly inferior, and *Anotheca* in which the ovary is 2-chambered and superior. The latter are annuals. These subgenera are not accepted here as the distinctions are not very clear-cut. Also many of the tropical species are still incompletely known.

Sonder (l.c.), for convenience, divided the species into three series separated on the number of chambers in the ovary. A more detailed subdivision was made by Von Brehmer (l.c.) who recognised and named a number of series. His scheme is followed to a large extent here. Among the series, one, *Junceae*, differs so much from all the others that it is now accepted as constituting a distinct section of the genus. This was, in fact, first carried out by A. De Candolle (DC. Prodr. 7. 441. 1839) though he included the species under *Wahlenbergia*.

Key to the Sections.

1. Ovary 5-, 4- or 3-chambered, rarely 2-chambered, not wholly inferior: fruit about as wide as long, firm, the valves about as long as the lower part .. .. 1. *Lightfootia*

1. Ovary 2-chambered, wholly inferior: fruit longer than wide, thin-walled, the valves much shorter than the lower part .. 2. *Phyteumoides*

Section 1. **LIGHTFOOTIA.**

Shrublets or herbs. Flowers mostly small. Ovary 3-, 4- or 5-locular, rarely 2-locular, ranging from superior to almost inferior. Fruit firm, sometimes almost woody, as wide as or wider than long, with valves about as long as the lower part.

As this section contains the type species, it retains the generic name. The section is divisible into a number of series based upon vegetative and floral features.

Key to the Series.

- 1. Shrublets: leaves small, rarely over 1 cm. long and 0·2 cm. wide.
  - 2. Ovary superior or nearly so, wider than long.
    - 3. Leaves thin, longer than wide.
      - 4. Pedicels short or wanting: ovary 5-, 4- or 3-chambered *Subulatae*
      - *4.* Pedicels long and slender: ovary 3-chambered .. *Parvifoliae*
    - *3.* Leaves thick, about as wide as long.
      - 5. Leaves alternate, fasciculate: flowers solitary on rigid pedicels .. .. *L. intricata*
      - *5.* Leaves opposite: flowers many .. .. .. *L. multicaulis*
  - *2.* Ovary inferior or half-inferior, 3- or 2-chambered.
    - 6. Corolla with a tube more than 1 mm. long.
      - 7. Leaves opposite .. .. *Oppositifoliae*
      - *7.* Leaves alternate.
        - 8. Leaves revolutely rolled, ericoid .. .. .. *Laricifoliae*
        - *8.* Leaves not rolled.
          - 9. Flowers sessile .. .. *L. spicata*
          - *9.* Flowers pedicellate.
            - 10. Leaves spreading or ascending.
              - 11. Leaves distant, short, subulate: stems green .. .. *Paniculatae*
              - *11.* Leaves, at least the lower, close, not subulate: stems not green.
                - 12. Slender: leaves mucronate: corolla tube longer than the calyx lobes .. *L. divaricata* var. *debilis*
                - *12.* Stouter: leaves acute: corolla tube not longer than the calyx lobes.
                  - 13. Leaves revolute, toothed: flowers solitary or few, in cymose groups .. .. *L. divaricata*
                  - *13.* Leaves not revolute: flowers many, in a panicle.
                    - 14. Panicle racemose or spicate: corolla tube shorter than the calyx lobes: leaves keeled below .. .. *Longifoliae*
                    - *14.* Panicle branched: corolla tube as long as the calyx lobes: leaves flat, toothed *Denticulatae*
            - *10.* Leaves reflexed or recurved.
              - 15. Leaves rigid, concave above: corolla tube as long as or longer than the calyx lobes .. .. *Adpressae*
              - *15.* Leaves flat, not rigid: corolla tube shorter than the calyx lobes .. .. *Thunbergianae*
    - *6.* Corolla tube very short, less than 1 mm. long.
      - 16. Leaves ericoid, revolutely rolled .. .. .. *Laricifoliae.*
      - *16.* Leaves flat or revolute at the edges only.
        - 17. Leaves ascending: inflorescence contracted: stems usually unbranched .. .. .. *Longifoliae*

17. Leaves spreading or reflexed.
18. Leaves spreading, very short: flowers few in a terminal group . . . . *L. pauciflora*
18. Leaves reflexed or recurved.
19. Leaves concave above.
20. Leaves thick: flowers axillary or on stout branches . . . . . . *Tenellae*
20. Leaves rigid, not thick: flowers on long slender branches . . . . *Adpressae*
19. Leaves flat.
21. Upper internodes long: inflorescence a panicle: flowers blue . . . . *Longifoliae*
21. Leaves uniformly distributed: flowers axillary, white . . . . *Tenellae*
1. Tall herbs: leaves over 1 cm. long and 0·3 cm. wide.
22. Flowers sessile, in heads or spikes.
23. Heads terminal . . . . *Rupestres*
23. Heads lateral, sessile . . . . *Marginatae*
22. Flowers pedicellate, in a panicle . . . . *Abyssinicae*

Following the precedent set by Sonder and von Brehmer, the series *Subulatae* characterised by having more than 3 chambers in the ovary is placed first. The series *Oppositifoliae* and *Parvifoliae* which are allied in floral structure though constantly 3-chambered are placed next. Of the series, *Denticulatae* is the least specialised in habit, stands nearest to *Wahlenbergia*, and is probably the most primitive.

Series 1. **Subulatae** v. Brehm. l.c.

Shrublets, usually small. Leaves alternate or opposite. Flowers axillary, most often solitary, sessile or on short pedicels. Ovary almost superior, wider than long, 5-, less often 4- or 3-chambered.

The type species is *L. subulata* L'Herit.

KEY TO THE SPECIES.

1. Leaves very slender, linear-trigonous: corolla tube very short.
2. Leaves all alternate: fruit valves as long as the calyx lobes . . *subulata*
2. Leaves all or most of them opposite.
3. Ovary conical above: valves as long as the calyx lobes . . *subulata* var. *tenuifolia*
3. Ovary flat on top: valves shorter than the calyx lobes . . *subulata* var. *congesta*
1. Leaves 1 mm. or more wide, flat at least at the base: flowers usually hispid: corolla tube at least 1 mm. long.
4. Leaves alternate.
5. Flowers sessile: ovary about half inferior . . . . . . *spicata*
5. Flowers pedicellate: ovary half superior . . . . . . *rubioides* var. *Stokoei*
4. Leaves mostly opposite: flowers pedicellate: ovary at least half superior.
6. Leaves concave above or rolled upwards: corolla tube shorter than the lobes . . . . *rubioides*
6. Leaves flat: corolla tube as long as the lobes.
7. Erect shrublets: leaves short, rigid: flowers solitary or few: ovary 3-chambered . . . . *brachyphylla*
7. Almost herbaceous: leaves thick: flowers grouped at the top: ovary usually 4-chambered . . . . *multicaulis*

1. **L. subulata** L'Herit. Sert. Ang. 1. 1788. *L. sessiliflora* Sond. Fl. Cap. 3. 555. 1865. *non* Spreng. *Campanula sessiliflora* L.f. Supp. Pl. 139. 1781. *L. fruticosa* Druce Rep. Bot. Ex. Club Br. Is. 3. 5. 420. 1914. (cf. Adamson, J. S. Afr. Bot. 19. 157. 1953).

Stems woody in the lower parts, commonly with long prostrate branches and few or many erect branchlets. Young stems with short hairs either all over or in lines. Leaves alternate, crowded or distant, up to 1·5 cm. long, linear-subulate, flat or grooved above, keeled below, often trigonous, toothed on the edges, commonly with axillary fascicles. Flowers in the upper axils, crowded or distant, many or few, on pedicels 1—4 mm. long, shorter than the subtending leaves. Calyx lobes 2—4 mm. long, acute or mucronate, keeled and almost trigonous, bulged or even pouched at the base. Corolla blue, pale blue or white, 5—7 mm. long, rather thin, the tube very short, the lobes narrow and almost cucullate. Bases of the filaments oblong-spathulate, acute to obtuse or even truncate, ciliate. Ovary almost superior, the lower part very short, retuse at the base, usually hairy, the upper part conical, glabrous. Style thickened near the top: stigma lobes 5 or 4, rarely 3. Fruit wider than long, 5-, 4- or rarely 3-chambered, the valves as long as the calyx lobes.

The type is *Masson* s. n. in herb. BM.

Common on stony or gravel soils at low altitudes in the S.W. Cape. Variable in habit and in size. While the number of carpels is most commonly 5, individual flowers may have 4 or more rarely 3.

VAN RHYNSDORP. Giftberg, *Drege* (*L. subulata* d) (G): *Esterhuysen* 22018 (BOL).

CERES. Leeuwfontein, *Pearson* 3234 (BOL).

WORCESTER. Bainskloof, *Moss* 5388 (BM): *Salter* 5115 (BOL).

PAARL. Witte Riv., *Adamson* 4742: *Esterhuysen* 12740 (BOL): Seven Sisters, *Adamson* 4746: Suurvlakte, *Esterhuysen* 12336 (BOL): Dal Josaphat, *Drege* 6312 (G.S): Du Toits Kloof, *Drege* (*L. subulata* b) (G): Wemmershoek, *Compton* 4952 (NBG): Franschhoek, *L. Bolus* (BOL): *Esterhuysen* 3081 (BOL): *Galpin* 12449 (K, PRE): *Rodin* 3081 (K, PRE).

STELLENBOSCH. Stellenbosch, *Garside* 678 (K): *C. A. Smith* 5147 (K): Somerset West, *Parker* 3635 (BOL, NBG): Sir Lowry Pass, *Adamson* 4043 (CT), 4894. 4896: *Compton* 3380 (NBG): 12330 (NBG): *Stokoe* (SAM): Van der Stel, *C. A. Smith* 5147 (PRE): Gordon's Bay, *Adamson* 4043: *Verreaux* (G).

CAPE. Cape Flats, *Ecklon* 280 (S): *Zeyher* 1083 (S): Tygerberg, *Drege* (K, S): Cape Town, *Young* (PRE): Table Mt., *Alexander* (K): *Bolus* 750 (BM): *Burchell* 9 (K): *Ecklon* (K): *Dümmer* (CGE): *Harvey* (K): *MacGillivray* 604 (K): *Moss* 7546, 7547, 7548 (BM): Kloof Nek, *Burchell* 284 (G, K): *Moss* 6063 (BM): Orange Kloof, *Wolley-Dod* 2223 (BM, BOL, K):

Lion's Head, *Kensit* (CT): *Moss* 7564 (BM): *Pappe* (S, SAM): Camps Bay, *Alexander* (K): *Harvey* (K): *Galpin* 4307 (PRE): *Marloth* 3276 (PRE): *Morris* 124 (NBG): *Salter* 291/17 (BM): Llandudno, *Compton* 16587 (NBG): s.n. (BOL): Devil's Peak *Adamson* 778 (PRE): *O. Kuntze* (K): *Page* (CT): *Rehmann* 1049 (BM, BOL): Mowbray, *Page* (CT): Camp Ground, *Bolus* 3275 (BOL): University Gds., *Levyns* 3557 (CT): Claremont, *Page* (CT): Kirstenbosch, *Esterhuysen* 12626 (BOL, PRE): Vlaggenberg, *Adamson* 2385 (BOL): *Wolley-Dod* 693 (K): Constantiaberg, *Wolley-Dod* 692 (BM, BOL, K): Chapmans Peak, *Wasserfall* 700 (NBG): Steenberg, *Bolus* 9350 (BOL, K): *Salter* 5723 (CT): Fishhoek, *Young* (PRE): Kommetje, *Compton* 12595 (NBG): *Levyns* (CT).

CALEDON. Sir Lowry Pass, *Adamson* 4896: Kogel Bay, *Esterhuysen* 13718 (BOL): Rooi Els, *Esterhuysen* 13320 (BOL): Grabouw, *Bolus* 4162 (BOL), 4164 (K): *Maguire* 1082, 1231 (NBG): Elgin, *Lewis* (SAM): Bot River, *Adamson* 4890: Hawston, *Adamson* 4892: Babylon's Tower, *Zeyher* 3124 (K, S, SAM): Shaws Mt., *Barker* 7193 (NBG): Hermanus, *Gillett* 525 (BOL): Mossel Riv., *Potts* 5001 (SAM): *Salter* 5164 (BM, K): Caledon, *O. Kuntze* (K): Genadendal, *Burchell* 7903 (K).

BREDASDORP. Cape Agulhas, *Leipoldt* 3708 (BOL): Elim, *Adamson* 4779: *Bolus* (PRE): Napier, *Adamson* 4772 (PRE).

SWELLENDAM. Mts., *Bowie* (BM).

Without locality:—*Commerson* (G): *Delessert* (G): *Drege* (BM, CGE): *Ecklon* s.n. (K), 280 (S): *Ecklon & Zeyher* (CGE, PRE): *Goodenough* (K): *Guthrie* 1150 (NBG): *Harvey* 470 (BM), 475, 499 (K), s.n. (BM, S): *Masson* (BM): *Sieber* (K): *Verreaux* (G): "Cape Town Flower Show", *Marloth* 9485 (PRE).

Var. **tenuifolia** Adamson var. nov.

A typo differt ramis tenuioribus, foliis saepissime oppositis tenuissimis integris vel basi solum minute denticulatis, floribus paucis, lobis calycis basi vix saccatis.

More slender and less woody than the typical form. Leaves very slender, 5—8 mm. long, mostly opposite, either entire or with minute teeth near the base. Flowers few. Calyx lobes enlarged but scarcely bulged at the base. Corolla usually deep blue. Valves in fruit slightly longer than the calyx lobes.

The type is *Adamson* 4911 (BOL).

Rocky or stony mountain slopes between 1,500—3,000 ft.

PAARL. Franschhoek Pass, *Adamson* 4911, 4912: *Gillett* 753 (BOL): *Leipoldt* 3708 (BOL): Hawaqua Peak, *Adamson* 4750, 4742A.

Var. **congesta** Adamson var. nov.

A typo differt caulibus erectis numerosis, foliis oppositis, floribus in apice congestis, ovarii parte superiore plano, valvis fructus lobis calycis distincte brevioribus.

In tufts, with many erect stems up to 15 cm. high, branched from the base. Leaves mostly opposite, 5—8 mm. long, toothed. Flowers crowded at the tips of the branches, in a spike 1—2 cm. long. Ovary flattened not conical on top. Fruit wider than long, the valves less than half as long as the spreading calyx lobes.

The type is *Adamson* 4812 (BOL).

Rare on sand over limestone near the coast.

SWELLENDAM. Infanta. *Adamson* 4812.

The plant described as *L. sessiliflora* var. *foliosissima* Sond. Fl. Cap. 3. 555. 1865, is uncertain. It was based on *Zeyher* 1083 (G) which is a scrap of a small prostrate plant with woody stem, and densely crowded fasciculate leaves which are toothed and hispid on the midrib below. The imperfect flowers appear to be solitary. The material is inadequate for determination. The plant does not seem to have been collected since.

2. **L. spicata** Buek in E. & Z. Enum. 374. 1837.

L. macrostachys A.DC. in DC. Prodr. 7. 787. 1839.

An erect woody shrublet up to 35 cm. high, with erect or ascending branches. Stems brown or purple, ridged, with hairs on the ridges. Leaves alternate, fasciculate, reflexed or recurved, oblong-lanceolate, acute, 4—8 mm. long, 1—1·5 mm. wide, rather thick, grooved above, keeled below, the edges thickened and with a few small obtuse teeth near the base. Inflorescence spike-like, often secund. 1—3 cm. long. Flowers sessile in the axils of small leaf-like bracts about 2 mm. long. Calyx lobes 1·5—2 mm. long, acute, keeled. Corolla white or yellow-white, 4—5 mm. long, the tube 1—1·5 mm. long, the lobes densely hispid on the back. Bases of the filaments oblong, acute, shortly ciliate. Style thickened in the upper half, coarsely hairy: stigma 3-fid. Ovary half-inferior, 3-chambered, the lower part rounded, about 1 mm. long, usually hispid. Valves in fruit slightly shorter than the calyx lobes.

The type is *E. & Z.* (Tulbagh Waterfall) S.

Rocky places on the western mountains.

VAN RHYNSDORP. Giftberg, *Drege* (G, S): *Esterhuysen* 22073 (BOL).

CLANWILLIAM. Cedarberg, *Drege* (G): Blaauwberg, *Drege* (BOL, S, K): Krakadouw Poort, *Esterhuysen* 12257 (BOL): *Stokoe* (SAM): Grassruggens, *Pillans* 8788 (BOL): Krakadouw Pk., *Pearson* 5312 (K): Greys Pass, *Pillans* 5182 (BOL): Algeria, *Bond* 1420 (NBG).

CERES. Schurfteberg, *Schlechter* 10182 (BM, G, K, PRE).

TULBAGH. Waterfall, *E. & Z.* 2349 (S).

PIKETBERG. 24 Rivers, *Esterhuysen* 16619 (BOL, PRE).

WORCESTER. Hex River Mts., *Rehmann* 2609 (K): Kleinberg, *Esterhuysen* 9951 (BOL): Slanghoek Needle, *Esterhuysen* 17767 (BOL, PRE): Du Toits Kloof, *Drege* 6314 p. pte. (S).

PAARL. Drakenstein Mts., *Drege* (K, S).

Without locality:—*Drege* s.n. (G), 6315 (S).

3. **L. rubioides** A.DC. Monog. Camp. 116. 1830.

Main stems woody, most commonly prostrate, up to 30 cm. long, with few or many erect almost herbaceous branches. Young stems red-brown, ridged, hairy. Leaves mostly opposite, spreading, rather rigid, usually fasciculate, 4—8 mm. long, 1—3 mm. wide, acute, flat or more commonly folded upwards, rounded below, the edges with minute obtuse teeth. Lower leaves crowded, the upper close or distant. Flowers terminal and axillary, solitary, the terminal with pedicels 4—9 mm. long, the lateral about 2 mm. long. Pedicels and calyx hispidulous. Calyx lobes 1·5—3 mm. long, bulged on the back, often toothed, revolute in the older phases. Corolla white, 4—6 mm. long, hispidulous or rarely subglabrous, the tube as long as or longer than the calyx lobes. Bases of the filaments oblong-obovate, ciliate on the upper part. Ovary hispid, at least half superior, 5-, 4- or 3-chambered, the lower part distinctly wider than long. Style thickened below the stigma. Fruit 2—4 mm. diam., 1·5—2 mm. long: valves about as long as the calyx lobes.

The type is *Masson* s.n. in herb. BM.

Rock crevices, especially where moist or sheltered, on the western and south-western mountains.

Variable in habit, in the size and closeness of the leaves, and in the number of flowers. While extreme forms look distinct they are connected by all stages of intermediate. In collections this has been much confused with *L. spicata* and *L. oppositifolia*. From the former it is distinguished by the opposite leaves, pedicellate flowers, and less inferior ovary. From the latter by the stouter habit, thicker and involute leaves, short pedicels, hairy flowers and less inferior ovary.

VAN RHYNSDORP. Giftberg, *Drege* (G, S).

CLANWILLIAM. Duivelskop, *Stokoe* (SAM): Sneeuwberg, *Esterhuysen* 13821 (BOL).

CERES. Visgat, *Esterhuysen* 13418 (BOL, K, NBG, PRE), 13420 (BOL): Onderboskloof, *Esterhuysen* 14301 (BOL): Elandskloof, *Esterhuysen* 4200 (BOL): *Henderson* 2230 (NBG): Rosendalfontein, *Pillans* 9673 (BOL): Schurfteberg, *Adamson* 4915, 4920: Roodeberg, *Compton* 8430 (NBG): *Esterhuysen* 1473 (BOL, NBG, PRE): Baviaansberg, *Bond*

1445 (NBG): Mostertsberg, *Schlechter* 56 (BM, CGE, PRE): Ceres, *Bolus* 1078 (BM, BOL, G, K, SAM).

TULBAGH, Zuurvlakte, *Stokoe* (SAM).

WORCESTER. Modenaarskop, *Stokoe* (SAM): Du Toits Peak, *Esterhuysen* 8575 (BOL): Du Toits Kloof, *Drege* (K, S).

PAARL. Suurvlakte, *Adamson* 4331, 4333: Franschhoek Pass, *Gillett* 743 (BOL): *Stokoe* (SAM): Franschhoek, *Bolus* 5100 (BOL, K): *Schlechter* 97 (PRE), 9352 (G, K, PRE).

CALEDON. Villiersdorp, *Adamson* 4910: *Hafstrom & Acock* 1478 (PRE): *Salter* 5200 (BM, BOL, K): Viljoens Pass, *Adamson* 4909: Grabouw, *Stokoe* (SAM): Sir Lowry Pass, *Compton* 16896 (NBG): *Leighton* 922 (BOL): Palmiet River, *Esterhuysen* 12566 (BOL): *Levyns* 5341 (CT): *Schlechter* 600 (PRE), 7454 (BM, K): *Stokoe* 8659 (BOL), s, n. (SAM): Betty's Bay, *Compton* 21918 (NBG): Hermanus, *Gillett* 525 (BOL): Houwhoek, *Burchell* 8164 (K): Genadendal, *Bolus* 6950 (K): *Schlechter* 96 (PRE), 9857 (G, K): Sondereinde Mts., *Adamson* 4437: Nieuw Kloof, *Schlechter* 383 (PRE), 7527 (BM, BOL, K), 7529 (K).

Without locality:—*Auge* (BM): *Balston* (vicinity of Cape Town) (BM).

Var. **Stokoei** Adamson var. nov.

A typo differt caulibus suberectis, foliis alternis longioribus, floribus pedicellatis, calycibus, corollisque subglabris.

Taller and more erect than the typical form. Leaves mostly alternate, linear, up to 1·5 cm. long, involute or almost trigonous, minutely toothed. Flowers on pedicels 3—5 mm. long. Ovary, calyx and corolla subglabrous. Stigma 3-, 4- or 5-lobed.

The type is *Stokoe* (SAM, 63249) SAM.

Rare on mountains in the south-west.

PAARL. Franschhoek Mts., *Stokoe* (SAM).

CALEDON. Paardeberg, *Stokoe* (SAM) (type): Palmiet Riv., *Adamson* 4210: *Stokoe* (SAM): Grabouw, *Stokoe* (SAM): Modenaarskop, *Stokoe* (SAM):

4. **L. brachyphylla** Adamson sp. nov.

Suffrutex hispidula ramosa diffusa, ramis subdichotomis. Folia fasciculata parve rigida opposita vel superiora alterna. Flores pauci racemosi. Calyx hispida. Corolla alba tubo lobis subaequilongo. Ovarium fere superum hispidulum. Valvae fructus lobis calycis aequilongae.

Woody, harsh from hispid hairs. Stems many, erect or ascending, up to 45 cm. high, with forking branches. Leaves opposite or the upper alternate, fasciculate, short, 1—3 mm. long, spreading or partly reflexed, rigid and almost prickly, thick, concave above, often toothed near the base. Flowers few, in the uppermost axils, on pedicels about 2 mm.

long. Calyx lobes often reddish, hispid, acute, 1 mm. long. Corolla white, 4—5 mm. long, the lobes slightly hispid, about as long as the tube. Bases of the filaments oblong, densely ciliate. Style very slightly thickened at the top: stigma 3-fid. Ovary flattened, almost superior, 2—3 mm. diam., slightly bulged below the calyx lobes. Valves of the fruit as long as or very slightly longer than the calyx lobes.

The type is *Adamson* 4105 (BOL).

Rocky mountain slopes or occasionally on sand in the Cold Bokkeveld Mountains.

CERES. Cold Bokkeveld Mts., *Adamson* 4105, 4126, 4915, 4916, 4917, 4919, 5232-3: *Schlechter* 1770 (PRE), 10112 (BM, BOL, G, K, PRE).

5. **L. multicaulis** Adamson sp. nov.

L. rubioides affinis sed differt ramis erectis pernumerosis, foliis minutis, planis, floribus pedicellatis, in apice ramorum congestis, tubo corollae lobis aequilongo, ovario discoideo saepissime 4-loculare, valvis lobis calycis, longioribus.

Old stems woody, in the ground, the aerial herbaceous, erect, very numerous, 4—8 cm. high, in tufts or bunches. Leaves opposite, spreading or slightly recurved, 1—1·5 mm. long, rigid, triangular, the edges thickened, entire or with a few cilia-like teeth at the base. Flowers crowded at the tips, pedicels erect, 2 mm. long, each with a few pairs of very small leaves. Calyx lobes hispid, 1 mm. long, rigid, often toothed. Corolla blue or purplish, 4—5 mm. long, more or less hispid, the tube as long as the lobes and longer than the calyx lobes. Bases of the filaments narrowly elliptical, densely ciliate, the entangled cilia cohering. Style thickened at the top: stigma usually 4-fid. Ovary almost superior, discoid, usually 4-chambered, rarely 3 or 5. Valves in fruit longer than the calyx lobes.

The type is *Esterhuysen* 7427 (BOL).

A local endemic on the Cedarberg.

Related to *L. rubioides* but distinct in habit, the small leaves, cohering stamens and long valves in the fruit.

CLANWILLIAM. Pakhuis, *Esterhuysen* 7427 (BOL): Krakadouw, *Esterhuysen* 15014 (BOL): *Stokoe* (SAM): Heuning Vlei, *Esterhuysen* 21139 (BOL).

Series 2. **Parvifoliae** Adamson.

Tenues subprostratae. Folia parva alterna reflexa. Flores longipedicellati. Tubus corollae brevissimus. Ovarium fere superum triloculare.

Slender, more or less prostrate, subherbaceous. Leaves small, thin, alternate, usually reflexed. Flowers on long slender pedicels. Corolla tube very short. Ovary almost superior, 3-locular.

Only species: *L. parvifolia* (Berg.) Adamson.

6. **L. parvifolia** (Berg.) Adamson J. S. Af. Bot. 8. 273. 1942. *L. oxycoccoides* L'Herit. Sert. Ang. 1. t4. 1788. *Lobelia parvifolia* Berg. Desc. Pl. Cap. 345. 1767. *Campanula Ottoniana* R. & S. Syst. 5. 113. 1819.

Slender, sprawling, or prostrate, growing in tangles. Stems brown, very shortly hairy, up to 45 cm. long. Leaves alternate, distant, reflexed, ovate, oblong, or ovate-lanceolate, 3—6 mm. long, 1—2 mm. wide, flat, rather thin, acute, the edges slightly thickened and revolute, entire or with 1—2 small teeth at each side. Leaves not fasciculate. Flowers terminal on the branches, solitary or in lax groups of 2—3. Pedicels very slender, 0·5—1·5 cm. long. Calyx lobes 1·5 mm. long, linear, more or less keeled at the base. Corolla white, with pink or purple lines on the back, less often uniformly coloured, the tube very short. Bases of the filaments oblong, sub-obtuse, finely ciliate. Ovary almost superior, the lower part less than 1 mm. long, rounded or very slightly pointed at the base. Style slightly thickened below the stigma. Fruit 3-chambered, 2 mm. diam. valves shorter than the calyx lobes but longer than the lower part.

Sheltered places among rocks on mountains.

Variable in the size of the leaf and the length of the internodes. Specimens have been seen with subopposite leaves. Plants from inland stations have smaller and harder leaves which are more reflexed.

CAPE. Cape Flats, *Harvey* 561 (K): Table Mt., *Bolus* 3880 (BOL): *Compton* 10319 (PRE): *Ecklon* 151 (BM, p. pte, K): *Ecklon & Zeyher* 151 (BOL, K): 2360 (BOL, SAM), s.n. (SAM): *Gillett* 774 (K): *Harvey* (K): *MacGillivray* 611 (K): *Moss* 7544 (BM): *Pappe* (SAM): *Rehmann* 767 (BOL): *Verreaux* (G): *Young* (PRE): *Zeyher* 4893 (BOL, SAM), s.n. (S): Disa Gorge, *Compton* 21471 (NBG): Devils Peak, *Ecklon & Zeyher* 2360 (SAM): *Esterhuysen* 10052 (BOL): *Rehmann* 1047 (BM): Hout Bay, *Harvey* 260 (K): Constantiaberg, *Wasserfall* 148 (NBG): Kirstenbosch, *Moss & Rogers* 1703 (BM): Muizenberg, *Adamson* 1261 (PRE): *Bolus* 3880 (BM. K. PRE): *Galpin* 12554 (PRE): *Guthrie* 1429 (CT): *Harvey* (K): *Wallich* 391 (BM), s.n. (BM): Kalk Bay, *Adamson* 4469 :*Wolley-Dod* 696 (BOL, K), 698 (BOL, K): Simonstown, *Adamson*, 2334 (BOL): *Wright* (K): Red Hill, *Adamson* 4926: *Penfold* (NBG): Klaver Valley, *Salter* 291/19 (BM): Buffels Bay, *Compton* 6859 (NBG).

STELLENBOSCH. Jonkershoek, *Esterhuysen* 8793 (BOL), 11450 (BOL, NBG, PRE): *Rodin* 3243 (BOL, PRE): Triplets, *Esterhuysen* 9795 (BOL).

CALEDON. Hottentots Holland, *Ecklon & Zeyher* (G): Somerset Sneeuwkop, *Ecklon & Zeyher* (S): Rooi Els, *Stokoe* (SAM): Houwhoek, *Guthrie* 2274 (NBG): Caledon, *Gillett* 878 (BOL): Genadendal, *Schlechter* 95 (PRE). 3580 (PRE). 9810 (BOL. G. K. PRE): Greyton, *Elbricht* (PRE): River Sondereinde, *Ecklon* (S): *Schlechter* 9898 (PRE).

PAARL. Dal Josaphat, *Tyson* (BOL): Drakenstein Mts., *Drege* 6306 (G, K, S), 6315 (G).

RIVERSDALE. Riversdale, *Muir* 326 (PRE).

OUDTSHOORN. Swartberg Pass, *Adamson* 4360: *Pocock* S, 117 (BOL).

Without locality:—*Burmann* (G): *Ecklon & Zeyher* 2366 (G): *Forsyth* (K): *Goodenough* (K): *Harvey* 260 (BM), 12121 (BM): *Koenig* (BM): *Lehmann* (CGE): *Otto* (BM): *Masson* (BM): *Tyson* (SAM): *Ventenat* (G) *Wallich* (G, K).

"Cape Town Flower Show" *Marloth* 9484 (PRE).

Series 3. **Oppositifoliae** Adamson ser. nov.

Subherbaceae tenues subprostratae. Folia opposita plana. Flores pedicellati. Corollae tubus lobis calycis subaequilongus. Ovarium inferum triloculare.

Slender sprawling or prostrate subherbaceous plants. Leaves opposite, or the upper sometimes alternate, flat. Flowers few, pedicellate. Corolla tube as long as the calyx lobes. Ovary 3-chambered, inferior, rounded at the base.

KEY TO THE SPECIES.

1. Leaves linear or linear-lanceolate: flowers on long pedicels.	
2. Leaves soft, often reflexed: pedicels branched: ovary glabrous..	*oppositifolia*
2. Leaves wiry, spreading: flowers solitary: ovary hairy ..	*tenuis*
1. Leaves broad-oval, reflexed: flowers terminal on short pedicels	*cordata*

7. **L. oppositifolia** A.DC. Monog. Camp. 115. 1830. *L. capillaris* Buek in E. & Z. Enum. 372. 1837. p.pte.

Diffuse, decumbent or prostrate. Stems 10—30 cm. long, thin, wiry, branched, forming loose tangles. Stems red or brown, glabrous or with short hairs in lines. Leaves opposite or the upper partly alternate, not fasciculate, scattered, linear-lanceolate, 0·4—1·3 cm. long, 1—2 mm. wide, flat or slightly concave above, the edges more or less thickened, entire or with occasional minute teeth. Leaves spreading or partly reflexed, often shorter than the internodes. Flowers pedicellate, in the uppermost axils: pedicels slender, 0·3—2 cm. long, simple or branched. Bracts on the pedicels very small, often not opposite. Calyx and ovary glabrous. Calyx lobes 1—2 mm. long, acute or shortly hair-pointed, sometimes minutely toothed. Corolla white, pink or purplish outside, 4—8 mm. long, the tube about 2 mm. long, the lobes minutely ciliate. Bases of the filaments oblong, acute or acuminate or rarely truncate-mucronate. Style purple, thickened at the top. Ovary glabrous, inferior, hemispherical, flattened, or even retuse at the base, as wide as long. Fruit with distinct raised ribs, the valves as long as or slightly shorter than the calyx lobes.

The type is *Burchell* 606 in herb. DC. (G).

Sheltered places among rocks on mountains in the south-west.

Sonder (Fl. Cap. 3. 563. 1865) quotes *L. muscosa* Link Enum. 1. 217. 1821 and *L. lanceolata* Link l.c. as synonymous with this species. A. De Candolle regarded them as belonging to *L. parvifolia*. Both are inadequately described. The only specimen in Herb. Sonder labelled *L. muscosa* (*E. & Z.* 2361) is certainly *L. oppositifolia*. In herb. Sonder there are two sheets with the ticket *Drege* 6314, of which one is certainly this species and identical with specimens with this ticket in herb. Kew, the other belongs to *L. spicata*.

CLANWILLIAM. Lamberts Bay, *Pole Evans* 61 (PRE).

PAARL. Haalhoek Spitzkop, *Esterhuysen* 7707 (BOL): Hawaqua Peak, *Adamson* 4747, 4748: *Esterhuysen* 21186 (BOL).

WORCESTER. Du Toits Kloof, *Drege* 6314 (G, K, S p.pte).

STELLENBOSCH. Guardian Peak, *Adamson* 3652.

CAPE. Doornhoogde, *Ecklon & Zeyher* 2361 (S, SAM): Table Mt., *Burchell* 606 (G, K): *Ecklon & Zeyher* 2362 (S, SAM): Groote Kop, *Esterhuysen* 10060 (BOL, NBG): Devils Peak, *Wolley-Dod* 1043 (BOL, K): Constantiaberg, *Adamson* 4464 :*Compton* 16947 (NBG): Noordhoek Mts., *Adamson* 2432 (CT): *Salter* 291/21 (BM): Simonstown Mts., *Pillans* 4324 (K).

CALEDON. Sir Lowry Pass, *Adamson* 4897: *Stokoe* (SAM): Palmiet River, *Esterhuysen* 12566 (BOL, PRE): Genadendal, *Ecklon & Zeyher* 2342 (S, SAM): *Zeyher* (SAM).

Without locality:—*Harvey* 12117, 12118 (BM): *Masson* (BM): *Ventenat* (G).

8. **L. tenuis** Adamson J. S. Af. Bot. 7. 202. 1941.

Stems many, procumbent or ascending, wiry, up to 40 cm. long, branched, woody at the base only, the younger reddish. Leaves mostly opposite, wiry, linear, 0·5—1·3 cm. long, spreading or falcate, concave above, minutely toothed, the lower sometimes fasciculate. Flowers axillary, solitary, on roughly hairy pedicels 0·5—1·5 cm. long. Calyx lobes 2 mm. long. Corolla white, purple or brown-purple outside, glabrous, 4—6 mm. long, the tube 1—1·5 mm. long. Bases of the filaments obtusely lozenge-shaped, rather densely ciliate. Style blue or purple, gradually thickened above. Ovary hemispherical, covered with white hairs except for prominent green ridges. Valves shorter than the calyx lobes.

The type is *Adamson* 1684 (BOL).

A local endemic on sand on hills near Simonstown.

CAPE. Red Hill, *Adamson* 1683 (BM), 1684 (BOL, CT, PRE), 2336 (BOL, CT), 4927 (PRE): *Levyns* 5615, 5626 (CT): *Salter* 5704 (BOL, K): North-west of Simonstown, *Adamson* 4759, 4760, 4761.

9. **L. cordata** Adamson sp. nov.

Decumbens ramosus. Folia opposita non fasciculata congesta ovato-cordata. Flores pauci terminales pedunculati. Corolla calyci duplo longior, tubo breve. Ovarium obconicum, valvis lobis calycis aequilongis.

Slender, prostrate or decumbent, much branched, forming close masses. Stems woody at the base only, up to 25 cm. long. Leaves not fasciculate opposite, ovate, about 3 mm. long, 2—2·5 mm. wide, acute, cordate at the base, entire, thickened at the edges, flat or very slightly concave above, usually reflexed, often crowded and overlapping. Flowers 1—3, in the uppermost axils: pedicels hairy, erect, 3—6 mm. long. Calyx lobes 2·5 mm. long, acute, with thickened edges, revolute in the later phases. Corolla white, deep blue or purple outside, about 7 mm. long, the tube less than 1 mm., the lobes gradually narrowed to the cucullate tip. Bases of the filaments as broad as or broader than long, obtusely 3-lobed, very shortly ciliate. Ovary about half inferior, obconical, shortly pubescent. Style not thickened: stigma 3-fid. Fruit pointed at the base, 2 mm. long, the valves about as long as the erect calyx lobes, longer than the lower part.

The type is *Esterhuysen* 4732 (BOL).

Rocks on mountains near the central south coast.

A very distinctive species. In the shape of the reflexed leaves, and the short corolla tube it approaches series *Tenellae* but the herbaceous habit and opposite leaves place it here.

UNIONDALE. Kamanassie Mts., *Compton* 10550 (NBG): *Esterhuysen* 18420 (BOL, PRE): *Zinn* (SAM): Mannetjeberg, *Esterhuysen* 4732, 4733 (BOL).

PRINCE ALBERT. Swartberg, *Esterhuysen* 4514 (BOL).

A specimen, *Schlechter* 7529 (G), from Nieuwkloof, Uniondale, is probably this species but much taller, with toothed leaves, short pedicels, and a hispid ovary.

Series 4. **Denticulatae** von Brehm. l.c.

Annuals or herbaceous perennials. Stems unbranched or branched from the base. Leaves alternate, linear, flat, denticulate. Inflorescence branched, with small leaf-like bracts. Corolla tube about as long as the calyx lobes. Ovary inferior, 3-chambered.

KEY TO THE SPECIES.

1. Leaves all similar: flowers on short leafy branches .. .. *caledonica*
1. Upper leaves smaller and more distant than the lower: flowers on almost leafless branches.
  2. Leaves with small lateral teeth: ovary rounded, as wide as long.
    3. Lower leaves crowded, ascending: calyx lobes toothed: valves shorter than the calyx lobes .. .. .. *denticulata*

3. All the leaves scattered and spreading: calyx lobes thick, entire: valves about as long as the calyx lobes . . *namaquana*
2. Leaves with prominent almost spinous teeth: ovary obconical: small plant . . . . *albicaulis*

10. **L. denticulata** (Burch.) Sond. Fl. Cap. 3. 559. 1865. *Campanula denticulata* Burch. Trav. 1. 538. 1823. *Wahlenbergia denticulata* A.DC. Monog. Camp. 152. t16. 1830. *L. capillaris* Buek in E. & Z. Enum. 372. 1837. p.pte. *Wahlenbergia spinulosa* Engl. Bot. Jahrb. 10. 271. 1889. *W. Dinteri* Engl. Pflzw. Afr. 1. 573. 1910. *non* v. Brehm. *L. Dinteri* Engl. l.c.

Herbaceous or woody at the base only. Stems many, branched in the upper parts, 10—35 cm. high, ridged, hairy when young. Leaves alternate, linear or linear-lanceolate, 0·5—1·5 cm. long, up to 0·3 cm. wide but often less than 1 mm., flat, the edges thickened, with opposite pairs of acute teeth. Lower leaves crowded, ascending, sometimes fasciculate, the upper shorter and more distant. Flowers pedicellate, in a loose cymose panicle: pedicels 0·4—1 cm. long. Calyx lobes 2—3 mm. long, toothed at the edges. Corolla white, blue or blue-purple outside, 4·5—5 mm. long, the tube about as long as the lobes and as long as the calyx lobes. Bases of the filaments broadly rhombic or obtusely cruciform, densely but shortly ciliate. Style hairy, distinctly thickened in the upper half. Ovary inferior, 1·5 mm. long, 1 mm. diam., rounded at the base. Fruit hemispherical, the valves about half as long as the spreading calyx lobes.

The type is *Burchell* 2302 (K).

Rocky or stony places in the drier parts of the summer rainfall area. Very variable in size and amount of branching. *Wahlenbergia spinulosa* Engl. seems to be only a hairy form. The sheet, *Ecklon & Zeyher* 2342, in Sonder's herbarium which carries the MS description of *L. capillaris* is not this species but *L. oppositifolia.*

CAPE:

MAFEKING. Mafeking. *F. Bolus* 6456 (K, NBG): Maribogo, *Burtt-Davy* 11023 (PRE).

KURUMAN. Kuruman, *Bolus* 2534 (BOL, SAM): Pneil, *Acock* 710 (PRE), 1576 (K, PRE): Takim, *Burchell* 2302 (G, K, PRE).

VRYBURG. Vryburg, *Acocks* 12578 (K): *Henrici* 177 (PRE): Tigerkloof, *Brueckner* 454 (PRE): Armoedsvlakte, *Foley* 2781 (PRE): Welgelegen, *Burtt-Davy* (PRE): Hansforth, *Mogg* 8357 (PRE).

BARKLY WEST. Daniels Kuil, *Esterhuysen* 2059 (BOL).

KIMBERLEY. Kimberley, *Moran* (BOL, K): *Wilman* (PRE).

HAY. Witsands, *Acocks* 2166 (K): *Esterhuysen* (BOL): Rietfontein, *Burchell* 2000 (K): Dunmurray, *Wilman* 2320 (K).

MURRAYSBURG. Murraysburg, *E. P. Phillips* (SAM).

MIDDELBURG. Bangor Farm, *H. H. Bolus* (BOL).

ALBERT. Burgersdorp, *Cooper* 2674 (K).

ALIWAL NORTH. Orange River, *Gerstner* 260 (PRE).

GLEN GREY. Kliplaat River, *Drege* (K, S): *Ecklon & Zeyher* 2378 (SAM).

QUEENSTOWN. Shiloh, *Drege* (G).

CATHCART. Cathcart, *Rogers* 12671 (BM).

ALBANY. Highlands, *Hutchinson* 1508 (BOL, K, PRE).

BEDFORD. Bedford. *Hutton* (K).

UITENHAGE. Swartkops Riv., *Zeyher* 466 (BM, BOL, SAM), 3139 (S, SAM), 3199 (BOL).

CALEDON. Genadendal, *Pappe* (SAM): *Zeyher* 4 (SAM).

NATAL:

DURBAN. Durban, *Krauss* 102 (G): Umlaas River, *Wood* 316 (SAM): s.l. *Krauss* (BM).

O.F.S.:

FAURESMITH. Fauresmith, *Henrici* 2571 (PRE): *Kies* 221 (PRE): *Marais* 231 (PRE): *Verdoorn* 968, 1210, 2352 (PRE).

BOSHOF. Smitskraal, *Burtt-Davy* 10136 (PRE).

BLOEMFONTEIN. Bloemfontein, *Potts* s.n. (BOL), 2621, 2622 (BM), 13316 (K): *Rehmann* 3872 (K): Hillandale, *Wasserfall* 853 (NBG).

KROONSTADT. Kroonstadt, *Pont* 251 (PRE).

ROUXVILLE. Orange River, *Zeyher* 117.11 (S).

SENEKAL. Senekal, *Acocks* 12502 (PRE).

HEILBRON. Heilbron, *Flanagan* 1477 (BOL, PRE).

THABANCHU. Thabanchu, *Burke* (K).

TRANSVAAL:

CHRISTIANA. Christiana, *Burtt-Davy* 12942 (PRE): Kameelpan, *Theron* S 663 (PRE).

BLOEMHOF. Bloemhof, *Burtt-Davy* 4376, 14480 (PRE).

WOLMARANSSTADT. Boskuil, *Sutton* 243 (PRE): Wolmaransstadt, *Liebenburg* 3004 (PRE).

POTCHEFSTROOM. Tarental, *Louw* 1094 (PRE).

VEREENIGING. Houtkop, *Mogg* 21033 (BOL).

PRETORIA. Pretoria, *Young* (PRE): Kruidsruk, *Connell* 37 (PRE).

RUSTENBURG. Rustenburg, *Rogers* 22515 (PRE).

POTGIETERSRUST. Potgietersrust, *Galpin* 9020 (PRE).

MARICO. Malermani, *Beyer* (PRE).

PIETERSBURG. Zoetmakaar, *Rogers* 22525 (PRE): Marabastad, *Schlechter* 5346 (PRE).

LYDENBURG. Lydenburg, *Barnes* 398 (K).

NELSPRUIT. Nelspruit, *Anderson* (K): *C. A. Smith* 3544 (PRE).

BASUTOLAND. Leribe, *Dieterlen* 332 (PRE): Mafeteng, *Dieterlen* 1292 (PRE): Mamathes, *Guillermod* 372 (PRE): s.l. *Page* (BOL).

Without locality:—*Drege* s.n. (SAM), 4005 (S), 6300 (G): *Ecklon & Zeyher* 2378 (G).

Var. **transvaalensis** Adamson var. nov.

A typo differt caulibus longioribus apice solum ramosus, foliis majoribus, inflorescentiae ramis numerosis ascendentibus, fructibus basi subcomplanatis, valvis lobis calycis aequilongis.

Much taller, 25—50 cm. Stems almost woody, unbranched except in the inflorescence region. Leaves 1—2·5 cm. long, often appressed, the lower crowded. Inflorescence with many ascending branches. Calyx lobes with minute or no teeth. Fruit almost as wide as long, more or less flattened at the base, distinctly ribbed: valves about as long as the calyx lobes.

The type is *Moss* 9515 (BOL).

Grassveld, especially in the eastern parts.

CAPE:

KIMBERLEY. Warrenton, *Rogers* 24920 (PRE).

HAY. Witsands, *Acocks* 2160 (PRE).

PORT ST. JOHNS. Port St. Johns, *Wager* (PRE).

NATAL:

PINETOWN. Umlaas Riv., *Wood* 1878 (BM, K): Pinetown, *Acocks* 10868 (PRE).

DURBAN. Durban, *Krauss* 103 (K): "Natal coast", *Sutherland* (K): s.l. *Gerrard* 1501 (K).

O.F.S.:

ROUXVILLE. Caledon Riv., *Zeyher* s.n. (SAM).

TRANSVAAL:

SCHWEITZER REINEKE. Amalia, *Acocks* 12518 (PRE).

BLOEMHOF. Bloemhof, *Acocks* 12584 (PRE).

LICHTENBURG. Lichtenburg, *Louw* 1094 (PRE): Karannasfontein, *Rogers* 20628 (PRE).

RUSTENBURG. Daspoort, *Liendertz* 581 (PRE).

PRETORIA. Arcadia, *C. A. Smith* (PRE): Fairy Glen, *Codd* 2590 (PRE): *Munro* 1943, s.n. (PRE): *Repton* 1689 (PRE): *van Elden* (PRE): Irene, *Rogers* 23832 (PRE): Uitpoortjie, *Young* (PRE): Aapies Riv., *Bolus* 10892 (BOL, K): *Burke* (K): Dalepoort, *Repton* 377 (PRE).

JOHANNESBURG. Johannesburg, *Moss* 9515 (BOL).

PIETERSBURG. Pietersburg, *Bolus* 10892 (BOL, K, PRE), 13318 (BOL, K): Marabastad, *Schlechter* 4393 (BOL): Zwartfontein, *Burtt-Davy* 14049 (PRE).

LYDENBURG. Witkop, *Louw* 1327 (PRE): Sukukini, *Barnard* 398 (PRE).

NELSPRUIT. Pretorius Kop, *Codd & de Winter* 4915 (PRE): *van der Schyff* (PRE).

11. **L. caledonica** Sond. Fl. Cap. 3. 559. 1865. *L. Dieterlenii* Phill. Ann. S. Afr. Mus. 16. 178. 1917.

An erect or sprawling usually hairy shrublet, 40—50 cm. high. Stems branched from the base, densely clothed with leaves all along. Leaves ascending, crowded, fasciculate, linear, flat, rather rigid, 0·7—1·5 cm. long, about 2 mm. wide, often glaucous below, the edges thickened, revolute and strongly toothed. Inflorescence with ascending branches, either short or up to 6 cm. long. Bracts leaf-like, as long as or longer than the flowers except at the extreme tips. Pedicels 2—3 mm. long. Calyx lobes 2—3 mm. long, acute, thickened and revolute at the edges, toothed especially at the base. Corolla white or very pale blue, 6—7 mm. long, the tube 1·5 mm., more than half as long as the calyx lobes. Bases of the filaments narrow-spathulate-rhombic, densely ciliate and often coherent. Ovary almost inferior, turbinate below, with 5 projecting ribs. Fruit 2 mm. long and about as wide, the valves half to three-quarters the length of the calyx lobes.

The type is *Zeyher* (Caledon River), (S).

Rocky places in the upper grassveld.

Easily recognised by the hard toothed leaves and leaf-like bracts. The type specimen is poor and in fruit but certainly identical with the type of *L. Dieterlenii*, *Dieterlen* 528.

O.F.S.:

HARRISMITH. Harrismith, *Wood* 4815 (BOL, K, PRE, SAM).

ROUXVILLE. Caledon River, *Zeyher* (S).

FICKSBURG. Ficksburg, *Fawkes* 129 (NBG).

FOURIESBURG. Wyndford, *Gemmell* 5814 (PRE).

BETHLEHEM. Bethlehem, *Potgieter* (PRE).

TRANSVAAL:

JOHANNESBURG. Johannesburg, *Bryant* D177 (PRE): *Rand* 1252 (BM): Witwatersrand, *Hutton* 881 (BOL, SAM): Rooikop, *Galpin* 7145 (PRE): Roodepoort, *Moss* 7438, 7439 (BM): Kliptown, *Moss* 14095 (BM).

KRUGERSDORP. Witpoortjie, *Murray* 544 (PRE).

LICHTENBURG. Lichtenburg, *Leemann* 66 (PRE).

POTCHEFSTROOM. Rysmienbult, *Louw* 1380 (PRE).

BASUTOLAND. Leribe, *Dieterlen* 528 (K, PRE, SAM), 1980 (K): s.l. *Page* (BOL).

Without locality:—*Cooper* (K): *Zeyher* 1058 (BM, K), 1059 (BM).

N.B.—A ticket, *Zeyher* 1064, has been attached, evidently in error, to a specimen of this species in herb. Kew (cf. *L. adpressa*).

12. **L. namaquana** Sond. Fl. Cap. 3. 556. 1865.

Annual. Stems many from the root, up to 30 cm. high, not much branched, the younger covered with short hairs. Leaves alternate, not fasciculate, scattered, linear, 0·5—1 cm. long, less than 1 mm. wide, the edges with a few small teeth. Upper leaves smaller and more distant. Flowers solitary or in groups of 2—3, on pedicels 4—12 mm. long. Calyx lobes about 2 mm. long, ciliate, entire, rather thick. Corolla blue or white, 6—8 mm. long, the tube as long as the calyx lobes, the lobes very narrow. Bases of the filaments broadly rhombic, as wide as long, shortly ciliate. Style hairy, thickened at the top. Ovary inferior, densely covered with short white hairs except for green veins. Fruit glabrescent, a little longer than wide: valves as long as the calyx lobes.

The type is *Whitehead* in herb. T.U.C., Dublin.

Sand at low altitudes in Namaqualand.

A short-lived ephemeral. Like *L. denticulata* but smaller, with smaller less close and less toothed leaves, and thick entire calyx lobes.

NAMAQUALAND. Schaape River, *Bolus* 9417 (BOL): Steinkopf, *Taylor* 1201 (BOL): Spektakel, *Bolus* 9640 (BM, K): Modderfontein, *Whitehead* (S).

Without locality:—*Bolus* 9408 (BM, K): *Scully* 145 (BM).

13. **L. albicaulis** Sond. Pl. Cap. 3. 556. 1865. *Lobelia cinerea* Thunb. Prodr. Pl. Cap. 40. 1794.

Like *L. namaquana* but shorter. Stems white or pale-coloured. Leaves attenuate at the base, linear, flat, 0·4—1·5 cm. long, 0·2—0·4 cm. wide, the edges thickened and with pairs of narrow acute projecting teeth. Flowers sessile, axillary, solitary. Calyx lobes toothed. Corolla white, 4—5 mm. long, the tube half as long as the lobes, shorter than the calyx lobes. Ovary inferior, obconical, hairy.

A little known species which has not been collected for over 100 years. The only specimen in herb. Sonder (S), *Wyley* from Namaqualand, is of a small stemless plant with a tap root.

Series 5. **Paniculatae** Adamson ser. nov.

Herbae diffusae. Folia linearia distantia. Flores paniculati. Ovarium inferum, basi acutum, valvis brevibus.

Diffuse herbs with small distant leaves. Flowers in a branching panicle. Corolla tube short. Ovary inferior, 3-chambered, pointed at the base. Valves short, obtuse.

A series distinctive in habit. Allied to and possibly derived from series *Denticulatae*.

Only species, *L. paniculata*.

14. **L. paniculata** Sond. Fl. Cap. 3. 560, 1865.

Stems many from a woody base, 20—40 cm. long, green, wiry, glabrous, distinctly ridged. Leaves alternate, spreading, linear, revolute-subulate, entire, the lower 1—2 cm. long, the upper shorter and distant. Flowers in a lax panicle with divaricate branches. Bracts minute. Calyx lobes narrow, acute, 2—3 mm. long. Corolla white, the tube 1—1·5 mm. long, the lobes at least three times as long. Bases of the filaments triangular, acute, about as long as the calyx lobes, ciliate. Style longer than the corolla: stigma lobes 3, elongated. Ovary inferior, glabrous, top-shaped. Fruit 3-chambered, with obtuse valves about as long as the calyx lobes.

The type is *Burke & Zeyher* 1067 in herb. Sonder (S).

Rocky places on mountains in the Transvaal.

Easily distinguished by the green wiry stems, small distant leaves, lax inflorescence, and ovary pointed at the base. Not closely allied to any other. There is a note on a cover in herb. Kew suggesting the transfer to the genus *Cephalostigma* A.DC. but, though there is a similarity in habit, the structure of the stigma is against this.

KRUGERSDORP. Rarlton, *Jenkins* (K, PRE).

JOHANNESBURG. Johannesburg, *Kolbe* (BOL): *Young* 753 (PRE): Parktown, *Moss* 750, 973 (BM): *Rand* 1293 (BM): Roodepoort, *Mogg* 20238 (BOL, PRE): Northcliff, *Gilliland* (PRE): Modderfontein, *Gilliland* (PRE).

PRETORIA. Pretoria, *Murray* 710 (PRE): Hoornsnek, *Codd* 6479 (PRE).

WATERBERG. Nylstroom, *Galpin* 13276 (PRE).

RUSTENBURG. Magaliesberg, *Burke & Zeyher* 1067 (BM, BOL, G, K, S): *Obermeijer* 414 (PRE): *Repton* 439 (K, PRE): Breedstruk, *Codd* 2688 (PRE): Witpoortjie, *Moss* 3434 (BM): Hartebeestpoort Dam, *Fairall* 1607 (NBG): *Young* (PRE): Crocodile River, *Burtt-Davy* 203 (BOL, K): *Rogers* 14536 (PRE): Daspoort, *Obermeijer* 3 (PRE).

PIETERSBURG. Blaauwberg, *Leemann* 101 (PRE).

LETABA. Shilobane, *Junod* 1066 (PRE).

PILGRIM'S REST. Mariepskop, *Codd* 7810 (PRE).

BELFAST. Badplaats, *Galpin* 13276 (K, PRE).

ERMELO. Ermelo. *Burtt-Davy* 989 (PRE).

Ser. 6. **Longifoliae** von Brehm. l.c.

Shrublets. Stems unbranched or branched from the base. Leaves usually alternate, often not fasciculate. Flowers in a terminal panicle either raceme-like or spike-like. Corolla tube short. Ovary inferior, 3- or 2-chambered.

The type species is *L. longifolia* A.DC.

Key to the Species.

1. Inflorescence with bracts smaller than the leaves: leaves spreading or recurved.
    2. Leaves spreading or ascending: flowers white: ovary inferior: decumbent . . . . *longifolia*
    2. Leaves often recurved: flowers blue: ovary half-inferior: erect or sprawling.
        3. Leaves opposite: inflorescence spikelike: ovary hairy: valves shorter than the calyx lobes . . . . . . *stricta*
        3. Leaves alternate: inflorescence branched: ovary subglabrous: valves longer than the calyx lobes . . . . *multiflora*

1. Inflorescence with bracts like the leaves: leaves ascending, usually appressed.
    4. Stems stout: leaves revolute at the edges only: flowers white . . . . *axillaris*
    4. Stems slender: leaves revolute to the midrib: flowers blue . . *unidentata*

15. **L. longifolia** A.DC. Monog. Camp. 108. 1830. *L. erecta* Good J. Bot. 62. 48, 1924. p.pte.

Stems woody, decumbent, 15—40 cm. long, branched mostly from the base, the younger covered with very short hairs. Leaves linear, ascending. rather crowded, flat or concave above, bulged or obtusely keeled below, toothed on the edges especially near the base, the lower 1—3 cm. long, alternate, often fasciculate, the upper 0·5—1 cm. long, more distant, often partly opposite, spreading. Flowers pedicellate, commonly in a narrow raceme-like panicle either close or lax. Pedicels slender, 0·3—2·5 cms long: bracts usually shorter than the pedicels. Calyx lobes 1·5—2 mm, long, acute, bulged on the back, the edges minutely toothed and revolute at the fruiting stage. Corolla 6—8 mm. long, white, fading to yellowish. often with blue streaks outside: tube shorter than the calyx lobes: lobe, coarsely hairy on the back. Bases of the filaments oblong or oblong-rhombic, acute, densely but shortly ciliate at the top. Style blue but white at the top: stigma 2- or 3-fid. Ovary inferior, hemispherical, usually covered with short spreading hairs, 3- or 2-chambered. Valves half or less as long as the calyx lobes.

The type is *Ecklon* s.n. in herb. Dunant (G).

Lower mountain slopes and flats in the south-west.

Variable in size and in the form of the inflorescence. This is often branched in the later stages. Plants growing in dense vegetation may have solitary flowers on long slender pedicels.

MALMESBURY. Hopefield, *Leighton* 2449 (BOL, PRE): Mamre, *Salter* 2990 (BOL).

CAPE. Kraaifontein, *Young* (PRE): Cape Flats, *Ecklon* 78 (G, K), s.n. (S): *Pappe* (SAM): *Rehmann* 1947 (BM): Doornhoogte, *Ecklon & Zeyher* 2341 (S, SAM): *Wolley-Dod* 694 (BM, K): Maitland, *Guthrie* 754 (CT): Rondebosch, *Burchell* 177, 722 (K): Claremont, *Schlechter* 181 (K): Wynberg, *Wallich* 421 (BM): *Schlechter* 48 (CGE): Bergvliet, *Salter*

6528 (BOL): Tokai, *Levyns* 5612 (CT): Lakeside, *Moss & Rogers* 1648 (BM): Silvermine, *Compton* 16615 (NBG): Klaver Valley, *Moss* 7498 (BM): *Salter* 291/18 (BM): Klaasjagersberg, *Wolley-Dod* 303 (BOL, K): Brightwater, *Salter* 9026 (NBG, SAM): Schusterskraal, *Barker* 4007 (NBG): Witsands, *Gillett* 1512 (BOL): Theefontein, *Compton* 21848 (NBG): Smitswinkel, *Adamson* 5227: *Compton* 17927 (NBG): *Galpin* 12768 (K, PRE): Patrys Vlei, *Compton* 21187 (NBG): Paulsberg, *Salter* 5731 (CT): Platboom, *Levyns* (CT): Smiths Farm, *Adamson* 717 (BOL), 909 (CT): *Compton* 6065, 22702 (NBG): Cape Point, *Goulimis* (NBG).

STELLENBOSCH. Brackenfel, *Compton* 10119 (NBG): *Esterhuysen* 4056 (BOL): Eerste River, *Zeyher* 3123 (S, SAM).

CALEDON. Grabouw, *Bolus* 4165 (BOL): Palmiet River, *Guthrie* (PRE): *Galpin* 12913 (PRE): Hermanus, *Galpin* 12912 (K, PRE): Mossel River, *Potts* 5043 (SAM): Stanford, *Schlechter* 1994 (PRE), 10429 (BM, BOL, G, K, PRE).

Without locality:—*Ecklon* (G): *Harvey* 438 (BM), 458 (BM, K), 500 (BM, K): *Wallich* (K): "Cape Town Flower Show", *Marloth* 9486 (PRE).

Var. **corymbosa** Adamson nom. nov. *L. erecta* Good J. Bot. 62. 48. 1924. p.pte. *L. longifolia* var. *oppositifolia* Sond. Fl. Cap. 3. 558, 1865. p.pte.

Smaller and more erect than the typical form. Stems many, 12—30 cm. high, woody at the base. Leaves spreading, rather rigid, about 1 cm. long, often partly opposite, the older with axillary fascicles. Inflorescence corymbose, the branches erect or ascending, the outer 2—5 cm. long with distant very small leaves. Pedicels 1—2 cm. long, usually 1-flowered, shortly hairy, rather rigid.

The type is *Moss* 7499 (BM).

A local endemic confined to a few sandy areas in the southern Cape Peninsula.

This variety has been named *L. erecta* Good in collections but the type of that species, *Moss* 7498 (BM), is quite inseparable from *L. longifolia.* The specimen selected as the type of the variety, *Moss* 7499, was quoted by Good as belonging to his *L. erecta.*

CAPE. Klaver Valley, *Adamson* 836 (BOL, PRE): *Levyns* 5632 (CT): *Moss* 7499 (BM): *Salter* 5974 (BM, BOL, K, SAM).

16. **L. unidentata** A.DC. Monog. Camp. 109. 1830. *Campanula unidentata* Thunb. Prodr. 39. 1798. *non* L.f. *L. lycopodioides* A.DC. l.c. 114.

A virgate shrublet, 15—40 cm. high. Stems few or many, erect, unbranched except in the inflorescence, the younger hairy. Leaves dark green, alternate, not fasciculate, appressed-ascending, linear-lanceolate, 4—8 mm. long, about 1 mm. wide, the edges revolute to the midrib, with 1—2 sharp teeth near the base. Inflorescence contracted, a simple or compound raceme-like panicle with ascending branches, often secund. Pedicels shortly hairy, 2—12 mm. long. Calyx lobes acute, 2·5 mm. long, revolute. Corolla blue or white internally blue outside, 5 mm. long, glabrous or hairy, the tube very short. Bases of the filaments rhombic, as wide as long, ciliate on the upper edges. Style gradually thickened to the 3-fid stigma. Ovary hemispherical or turbinate, 1—1·5 mm. long. Fruit 10-ribbed, the valves less than half as long as the calyx lobes.

The type is in herb. Thunberg, Uppsala.

Mountain slopes and flats, especially on clay soils, in the central south-coast belt.

Rather variable in size and in the branching of the inflorescence. In the past two species were confused under the name *Campanula unidentata*. Linnaeus fil. described a Thunberg specimen which is *L. divaricata* Buek (*q.v.*). Thunberg (l.c. & Fl. Cap. ed. Schult. 172. 1823), however, described this species. A. De Candolle evidently based his full description on Thunberg's plant. The confusion was first realised by Roemer & Schiltes (Syst. 5. 114. 1819) though they did not separate the plants. Though no authentic specimen has been seen, *L. lycopodioides* A.DC. l.c. seems to be only a few-flowered form.

CALEDON. Swartberg, *Bolus* 7404 (BOL): *Zeyher* 3122 (K, PRE, S, SAM): Baths, *Bolus* 13314 (K, BOL): *Guthrie* 9 (BOL): *O. Kuntze* (K): *Purcell* (SAM).

RIVERSDALE. Albertinia, *Adamson* 4553: Garcias Pass, *Adamson* 4376, 4840: *Burchell* 6857 (K): *Esterhuysen* 17210 (BOL): Aasvogelberg, *Muir* 1449 (BOL, K, PRE): Zoetmelks River, *Burchell* 6736 (K).

MOSSEL BAY. Langeberg, *Muir* 1386 (BOL, PRE): *Guthrie* 4346 (BOL): Robinson Pass, *Adamson* 4869.

GEORGE. George, *Bolus* 8664 (BOL, K): *Schlechter* 2301 (K): *Zeyher* (SAM): Wilderness, *Compton* 15506 (NBG).

KNYSNA. Knysna, *Breyer* (PRE): Plettenberg Bay, *Pappe* (G, SAM): *Schlechter* 2301 (BOL): Keurbooms River, *Adamson* 5276: Kirby, *Fourcade* 5519 (BOL): Afghurst Flats, *Fourcade* 1082 (BOL).

UNIONDALE. Long Kloof, *Bolus* 2378 (BOL, K, SAM).

HUMANSDORP. Witelsbosch, *Fourcade* 1157 (BOL): Oudekraal, *Fourcade* 2430a (BOL).

17. **L. axillaris** Sond. Fl. Cap. 3. 558. 1865.

Erect woody shrublet with solitary stems 15—60 cm. high, either unbranched or with few ascending branches. Young stems brown, shortly hairy. Leaves alternate, brightish green, not fasciculate, ascending and loosely appressed, linear-lanceolate, 5—8 mm. long, 2—3 mm. wide, flat, acute, usually glabrous, the edges revolute, entire or with 1 or more small teeth at the base. Inflorescence contracted, spike-like, the branches ascending and appressed. Pedicels hispid, 2—6 mm. long, the flowers solitary or in groups of 2—3. Calyx lobes about 3 mm. long, acute, the edges slightly revolute, the midrib projecting. Corolla cream-white, 6—10 mm. long, the tube very short. Bases of the filaments oblong, ciliate at the top. Ovary hispid, turbinate, 2 mm. long. Fruit almost urceolate, subglabrous, the valves slightly shorter than the calyx lobes.

The type is *Ecklon* s.n. in herb Sonder. (S).

Confined to the mountains in the extreme south-west.

Allied to *L. unindentata* and often confused with it in collections. Readily distinguished by the much stouter stems, broader leaves revolute at the edges only, the denser inflorescence, and larger white flowers.

CALEDON. Hottentots Holland, *Ecklon* (S): Sir Lowry Pass, *Schlechter* 7244 (BM, BOL, G, K, PRE, SAM), 599 (PRE): Kogelberg, *Stokoe* 931 (PRE): Rooi Els, *Pillans* 8289 (BOL): Palmiet River *Adamson* 4174 (CT), 4903, 4906, 4907: *Esterhuysen* s.n. (BOL), 12580 (BOL), 13703, (NBG, PRE, BOL): *Levyns* 5374, 8805 (CT): Babylons Tower, *Esterhuysen* 4973 (BOL): Onrust, *Adamson* 4788: *Esterhuysen* 4926 (NBG).

BREDASDORP. Elim, *Bolus* 8568 (BOL, K): Bredasdorp Mts., *Galpin* 11269 (PRE).

18. **L. stricta** Adamson sp. nov.

Caules ex radice plures erecti pauciramosi. Folia opposita, linearia reflexa fasciculata. Inflorescentia spiciformis. Flores parvi pedicellati saepe in axillis aggregati. Corollae tubus perbrevis. Ovarium hemisphericum. Valvae fructus lobis calycis breviores.

Stems many, 15—40 cm. high, woody at the base only, unbranched or branched from the base, the younger hispidulous. Leaves fasciculate, mostly opposite, spreading or reflexed, linear, 4—9 mm. long, 1 mm. wide, slightly concave above, the midrib projecting below, the edges thickened and remotely toothed. Lower leaves crowded, the upper distant. Inflorescence a spike-like panicle 2—8 cm. long, usually with long internodes in the lower part. Bracts alternate, leaf-like but only 3—4 mm. long. Flowers distant or crowded, most often in groups of 2, 3 or 5. Pedicels hispid, ascending, 2—4 mm. long. Calyx hispidulous, the lobes 2 mm. long, concave inwards. Corolla blue, about 5 mm. long, the lobes acute, the tube very short. Bases of the filaments obovate, shortly ciliate at the top. Style distinctly thickened in the upper half. Ovary hispidulous, rounded below, 1 mm. long. Fruit hemispherical, 1—1·5 mm. long, with 10 ribs: valves shorter than the calyx lobes.

The type is *Adamson* 4862 (BOL).

Sand over limestone on flats near the coast.

RIVERSDALE. Gouritz River Mouth, *Adamson* 4856, 4862, 4865, 4867.

KNYSNA. Ruigte Vlei, *Fourcade* 3911 (BOL).

19. **L. multiflora** Adamson sp. nov.

Suffrutex ramosa. Folia alterna fasciculata reflexa linearia denticulata. Inflorescentia pedunculata paniculata floribus aggregatis. Flores parvi, lobis calycis cucullatis, corollae tubo perbreve. Ovarium semi-inferum rotundatum. Fructus valvae lobis calycis longiores.

Stems woody at the base, sprawling, with spreading or ascending branches, the younger shortly pubescent. Leaves alternate, fasciculate, the lower crowded and reflexed, the upper distant and spreading, linear 4—8 mm. long, about 1 mm. wide, concave above, the edges thickened and denticulate. Inflorescence on a peduncle 1·5—3 cm. long, paniculate, the branches ascending or spreading, the flowers in groups. Pedicels glabrous or with a few reflexed hairs, 3—6 mm. long. Calyx lobes 1 mm. long, cucullate, glabrous. Corolla blue, 3—4 mm. long, the tube very short. Bases of the filaments almost orbicular, 1 mm. diameter, ciliate on the upper edge. Style much thickened in the upper half: stigma 3-fid, with lobes about 1 mm. long. Fruit 2 mm. diameter, 3 mm. long, the lower part about 1 mm., distinctly ribbed: valves sub-obtuse, distinctly longer than the calyx lobes.

The type is *Adamson* 4850 (BOL).

Sandy flats in the Riversdale district.

Allied to *L. stricta* but quite different in leaf, inflorescence and flower.

RIVERSDALE. Albertinia, *Adamson* 4847, 4850: Botteliersfontein, *Muir* 1813 (BOL, PRE).

Ser. 7. **Laricifoliae** v. Brehm. l.c.

Shrublets. Leaves alternate, fasciculate, revolute or often rolled and ericoid, usually toothed. Flowers usually rather large, often aggregated in heads or groups. Ovary inferior or half-inferior, 3-chambered.

The type species is *L. cinerea* (L.f.) Sond.

Key to the Species.

1. Leaves revolute at least at the edges but not rolled .. .. *divaricata*
1. Leaves rolled, ericoid.
    2. Leaves very slender, filiform: flowers solitary or few .. *divaricata* var. *filifolia*
    2. Leaves stout, not filiform.
        3. Calyx lobes rolled like the leaves.
            4. Hairs woolly at least on the young parts: flowers in heads: ovary conical .. .. *cinerea*

4. Hairs straight, not woolly.
  5. Corolla tube 2 mm. long or more, about as long as the calyx lobes: ovary at least as long as wide.
    6. Leaves crowded, squarrose: ovary twice as long as wide, rounded at the base .. .. .. *calcarea*
    6. Leaves scattered, very short: ovary conical, narrowed to the base .. .. *rubens* var. *brachyphylla*
  5. Corolla tube less than 1 mm. long: ovary as wide as or wider than long .. .. *rubens*
3. Calyx lobes flat or revolute at the edges, not rolled.
  7. Flowers solitary: inflorescence branched: corolla tube less than 1 mm. long .. .. *albens*
  7. Flowers subsessile in groups: corolla tube 3—4 mm. long, as long as the lobes .. .. *squarrosa*

20. **L. divaricata** Buek in E. & Z. Enum. 375 1837 (cf. Adamson J. S. Af. Bot. 19. 159. 1953). *L. ciliata* Sond. Fl. Cap. 3. 561. 1865. *non* Spreng. *Campanula unidentata* L.f. Supp. Pl. 139. 1781. *C. ciliata* Thunb. Fl. Cap. ed. 1. 2. 24. 1818. *non* Stev. *C. Thunbergii* Roem. & Schult. Syst. 5. 135. 1819. *Roella Thunbergii* A.DC. Monog. Camp. 174. 1830. *L. uitenhagensis* Buek l.c. *L. intermedia* Buek l.c. *L thymifolia* Buek l.c. p.pte.

Stems woody at least at the base, sprawling or prostrate, rarely erect, variable in length, usually hairy, sometimes coarsely or densely so. Leaves fasciculate, alternate, crowded or distant, most often spreading, linear-lanceolate to oblong-lanceolate, 4—8 mm. long, 1—3 mm. wide, glabrous or hairy, flat or more often revolute either at the edges or to the midrib, the edges often with cilia-like teeth near the base. Flowers solitary, terminal on the main stem and branches, often in lax groups, the flowering branches spreading or divaricate. Pedicels usually short. Calyx lobes 2·5—4 mm. long, narrow, acute, with revolute and often toothed edges. Corolla white but blue, purple or brown outside, 6—8 mm. long, the tube shorter than the calyx lobes. Bases of the filaments spathulate or rhombic-spathulate, sometimes almost 3-lobed at the top, densely ciliate. Ovary inferior, rounded at the base: valves in fruit much shorter than the calyx lobes.

The type is *Zeyher* s.n. (*E. & Z.* 2352) in herb. Sonder (S).

At low altitudes in the south and south-eastern coastal belts.

Variable in habit, leaf size and number, and in inflorescence. While extreme forms look distinct there are all stages of intermediate and no clear dividing lines can be drawn. Large robust forms have been named *L. uitenhagensis* (type *E. & Z.* 2345 (S)), while those with slender branched stems fall under *L. intermedia* (type *Zeyher* s.n. (S)). The specimen in the Linnean herbarium of *Campanula unidentata* L.f. is certainly this species; it was collected by Thunberg.

SWELLENDAM. Potteberg, *Compton* 19521 (NBG).

RIVERSDALE. Gouritz River Mouth, *Adamson* 4860, 4861.

MOSSEL BAY. Great Brak River, *Bolus* 8665 (K): *Compton* 23545 (NBG).

GEORGE. Wilderness, *Compton* 14349 (NBG).

KNYSNA. Heads, *Galpin* 11469 (PRE): *Martin* 36 (NBG): Nutzie, *Levyns* 7821 (CT): Goukamma Pass, *Fourcade* 6520 (BOL): Robbeberg, *Compton* 2998 (BOL): *Fourcade* 6484 (BOL): *L. F. Taylor* 2998 (NBG): Belvedere, *Duthie* 814 (BOL).

HUMANSDORP. Lourie Plantation, *Dix* 86 (BOL): Witelsbosch, *Fourcade* 1124 (BOL, K): Zeekoe River, *Drege* 6311 (G, S).

UITENHAGE. Uitenhage, *Ecklon & Zeyher* (S): *Thode* A674 (PRE): Bethelsdorp, *Zeyher* 3127 (SAM): Swartkops River, *Drege* (PRE): *Ecklon & Zeyher* s.n. (S), 54 (BOL,K), 2345 (S.SAM), 2351 (SAM), 2353 (S), 2354 (SAM): *Lynes* Z671 a & r (BM): *Zeyher* 54 (BM), 3130 (K, PRE, S, SAM): Enon, *Drege* (S): Addo, *Ecklon* 437 (SAM): Sundays River, *Ecklon & Zeyher* 2554 (SAM): Amsterdam Vlakte, *Ecklon & Zeyher* 70 (SAM), 2352 (SAM): Melkhoutboom, *Story* 2750 (PRE).

PORT ELIZABETH. Port Elizabeth, *Comins* 749 (PRE): *Forbes* 20 (BM): *Wilms* 2451 (BM, K): Redhouse, *Paterson* 294 (BOL, K): Thornhill, *Paterson* (PRE): Vaal Vlei, *Mogg* 4730 (PRE): Coega, *Compton* 19761 (NBG): *Ecklon & Zeyher* 15.3 (S): Earncliff, *Galpin* 6371 (PRE).

SOMERSET EAST. Zuurberg, *Long* 1235 (K): *Paterson* 55 (PRE): *Rennie* 468 (CT): Kleinmans River, *MacOwan* 1399 (SAM).

ALEXANDRIA. Alexandria, *Compton* 19668 (NBG): Nanaga, *Acocks* 12799 (PRE).

ALBANY. Grahamstown, *Acocks* 13618 (PRE): *Ecklon & Zeyher* 2343 (S, SAM), 2352 (S): *Zeyher* 3119 (SAM): Road to Riebeeck East, *Burchell* 3506 (K).

ALBERT. Nieuw Hantam, *Drege* 6317 (K).

UMTATA. Umtata, *Drege* 7496 (K, S).

NATAL. Umlaas Riv., *Wood* (SAM).

Without locality:—*Drege* (G), 6294 (G, S), 6316 (BM), 7496 (G): *Ecklon & Zeyher* s.n. (CGE), 2363 (BOL, G): *Zeyher* (S).

Var. **debilis** Adamson comb. nov. *L. ciliata* var. *debilis* Sond. Fl. Cap. 3. 561. 1865. *L.mucronulata* Buek in E. & Z. Enum. 375. 1837.

Slender, sprawling, forming loose tangles on the ground. Leaves distant, ovate-lanceolate, 3—4 mm. long, distinctly narrowed to the base, flat or revolute at the edges, the tip mucronate and hooked. Flowers mostly solitary. Calyx lobes 1—2·5 mm. long, toothed at the base. Corolla 4—5 mm. long, the tube often longer than the calyx lobes.

The type is *Zeyher* 3131 (S).

Damp places on the southern coastal strip.

GEORGE. Wilderness, *van Niekerk* 250 (BOL).

KNYSNA. Knysna, *Pappe* (SAM): *Penther* 2754 (BM): Portland, *Duthie* 915 (BOL): Barrington, *Steyn* 752 (NBG): Diep River, *Bolus* 2377 (BOL, K): Umtini River, *Schlechter* 5901 (K): Umtini River, *Schlechter* 2476 (PRE).

HUMANSDORP. Riet Vlei, *Esterhuysen* 6613 (BOL): Ratelsfontein, *Fourcade* 114 (BOL): Witelsbosch, *Fourcade* 1124a (BOL): Kromme River, *Burchell* 4870 (K): Maitland, *Burchell* 4583 (K).

UNIONDALE. Joubertina, *Esterhuysen* 6897 (BOL): de Hoek, *Esterhuysen* 10668 (BOL).

UITENHAGE. Van Stadensberg, *Bolus* 9140 (BOL): *Ecklon* 2363 (BOL): *Ecklon & Zeyher* (SAM): *MacOwan* 1101 (K): Winterhoek, *Zeyher* 3131 (S, SAM): Uitenhage, *Ecklon* (S): *Ecklon & Zeyher* 2353 (S, SAM): Zuurberg, *Drege* 6316 (S), s.n. (G, K).

ALBANY. Howiesons Poort, *Glass* 725 (SAM): Grahamstown, *Ecklon & Zeyher* 2313 (SAM): *MacOwan* 1504 (BOL): *Scott-Elliot* 835 (BM): Kraisfontein, *MacOwan* 181 (SAM), 1504 (SAM).

Var. **filifolia** Adamson nom. nov. *L. laricina* Buek in E. & Z. Enum. 373. 1837. p.pte. *L. thymifolia* Buek. l.c. p.pte. *L. Buekii* Sond. Fl. Cap. 3. 560. 1865.

More erect than the typical form. Leaves very slender, filiform, entire or minutely toothed at the base, 6—9 mm. long, apparently in tufts. Flowers mostly solitary, on slender pedicels 3—8 mm. long. Calyx lobes rolled, leaf-like, spreading in fruit. Corolla white, purplish outside, 7—8 mm. long, the tube very short. Ovary turbinate. Fruit 3—4 mm. long: valves obtuse, much shorter than the calyx lobes.

The type is *Zeyher* s.n. in herb. Sonder (S).

Apparently rare and seldom collected.

UITENHAGE. Swartkops River, *Zeyher* 3129 (K, PRE, S): s.l. *Zeyher* (S).

ALBANY. Bushmans River, *Story* 2291 (PRE).

21. **L. albens** Spreng. ex A.DC. Monog. Camp. 110. 1830. *L. laricina* Buek. in E. & Z. Enum. 373. 1837. p.pte.

A gray-green bushy shrublet, 20—40 cm. high, usually much branched. Stems densely covered with short hairs and appearing gray or white. Leaves alternate, fasciculate, ericoid-rolled, 0·3—1 cm. long, gray-green, glabrous or with a few scattered hairs, mucronate at the tip. Lower leaves crowded, the upper shorter and often distant. Inflorescence branched, the branches 1—5 cm. long, rigid, finally spinous. Flowers solitary. Calyx lobes flat, 3 mm. long, slightly revolute. Corolla white, usually brownish outside, 4·5—6 mm. long, the tube 1 mm. or less, the lobes cucullate. Bases of the filaments rhombic, acute, densely ciliate. Ovary half-inferior, as wide as or wider than long, the lower part rounded or slightly retuse. Fruit valves shorter than the calyx lobes.

The type is *Burchell* 2720 in herb. Kew.

Wide spread in dry situations in the south-eastern districts, also extending to the grassveld and the margins of the karroo.

Variable in size, in the amount of branching, and in the inflorescence. Much grazed in karroo localities and becoming compact. In collections it has been much confused with *L. nodosa* Buek. though the leaves are quite different.

CAPE:

CALEDON. Baths, *Drege* (BOL): Sondereinde River, *Zeyher* 3120 (K, S, SAM).

UITENHAGE. Uitenhage, *Alexander* (K): *Zeyher* 35 (K, S), 55 (BOL, BM): Swartkops River, *Ecklon & Zeyher* 2350 (SAM): *Harvey* 55 (SAM): *Lynes* 1442, Z671g (BM): *Zeyher* 55 (SAM), 438 (S), 3129 (PRE, S, SAM): Enon, *Baur* 1107 (K).

ALEXANDRIA. Alexandria, *Compton* 19662 (NBG).

ALBANY. Grahamstown, *Adamson* 5161: *Galpin* 198 (PRE): Cradock Road, *Dyer* 2206 (PRE).

BATHURST. Port Alfred, *Drege* 6317a (G).

SOMERSET EAST. Gt. Fish River, *Drege* 6317 (BM, CGE, G, K, S): Somerset East, *Acocks* 15673 (PRE).

PEARSTON. Buffelshoek Mts., *Story* 78 (PRE).

QUEENSTOWN. Bowkers Kop, *Tyson* (K, SAM): Lerrington, *Galpin* 2011 (PRE): Bailey, *Galpin* 2222 (PRE).

KOMGHA. Komgha, *Flanagan* 1361 (PRE, SAM), 3079 (BOL).

ALBERT. Burgersdorp, *Cooper* 654 (K), 774 (BM, BOL): *Guthrie* 4459 (NBG): Nooitgedacht, *Thorne* (SAM).

ALIWAL NORTH. Jamestown, *Acocks* 11189 (PRE): *Barker* 2150 (NBG): Aliwal North, *Gerstner* 142 (PRE): Elandshoek, *Bolus* 10525 (BOL): *Story* 2059 (PRE): Kruidfontein, *Thode* A1822 (K, PRE).

HERSCHEL. Sterkspruit, *Hepburn* 201 (SAM).

CRADOCK. Cradock, *Brynard* 6152 (PRE): *Talbot* (BOL): Vlekpoort, *Acocks* 12812 (PRE).

MIDDELBURG. Middelburg Road, *O. Kuntze* (K): Grootfontein, *Theron* 330 (PRE): Rietpoort, *Comins* 719 (PRE): Kikvorsch Mts., *Hutchinson* 3079 (K, PRE): *Dyer* 1909 (PRE).

RICHMOND. Compassberg, *Shaw* (K): Vlakplaats, *Bolus* 13814 (PRE).

GRAAFF-REINET. Graaff-Reinet, *Bolus* 86 (BM, BOL, K), 15 (BOL): Bethesda Road, Godfrey (PRE): Riet Vlei, *Galpin* 4969 (PRE).

COLESBURG. Colesburg, *Shaw* (K).

PHILLIPSTOWN. Rietfontein, *Burchell* 2720 (G, K): Paardeberg, *Burchell* 2692 (K).

O.F.S.:

FAURESMITH. Fauresmith. *Henrici* 1868 (PRE): *Pole Evans* 1646 (PRE): *C. A. Smith* 5462 (PRE): *Verdoorn* 1017 (PRE), 1366 (K), 2359 (PRE): Platberg, *Brueckner* 698 (PRE).

BLOEMFONTEIN. Bloemfontein, *Potts* 452 (BOL): Naval Hill, *Compton* 15682 (NBG).

THABANCHU. Sepani, *Brierley* 209 (BM).

BETHLEHEM. Bethlehem, *E. P. Phillips* 3125 (PRE).

DE WETSDORP. De Wetsdorp, *Steyn* 939 (BOL, NBG).

ROUXVILLE. Orange River, *Burke* (BM, K, PRE): *Zeyher* 1060 (BM, CGE, G, K).

HARRISMITH. Witzieshoek, *Junod* (PRE).

BASUTOLAND. Leribe, *Dieterlen* 402 (PRE): Mokodlong, *Guillermod* 1190 (PRE): Phutha, *Compton* 21642 (NBG): Thyateyaning, *Collett* 469 (K, PRE): Quthing, *Dieterlen* 1196 (SAM).

Without locality:—*Zeyher* 266 (G): *Verreaux* (G).

22. **L. cinerea** (L.f.) Sond. Fl. Cap. 3. 557. 1865. *L. albanensis* Sond. l.c. *Campanula cinerea* L.f. Supp. Pl. 139. 1781. *Roella cinerea* A.DC. Monog. Camp. 175. 1830. *L. grisea* Buek in E. & Z. Enum. 374. 1837.

Erect, sprawling or semiprostrate, usually gray in colour. Stems woody, branched, covered at least when young with white woolly hairs, the hairs few or many, sometimes confined to the apex and leaf axils. Leaves fasciculate, ascending or spreading, ericoid, rolled, 3—12 mm. long, commonly 4—6, mucronate at the tip, usually toothed at the base. Lower leaves crowded, the upper more distant. Leaves woolly at least in the axils. Flowers in heads surrounded by leaf-like bracts. Heads with 1—6 flowers, few or many, sessile, variously arranged, often on divaricate branches. Bracts erect or falcate, longer than the leaves. Flowers usually woolly, sessile. Calyx lobes leaf-like, rolled, usually toothed, 2·5—5 mm. long. Corolla white, brown or purple-brown outside, 6—9 mm. long, the tube 1·5 mm., the lobes hairy though sometimes only on the middle line. Bases of the filaments oblong to subrotund, folded inwards, obtuse or truncate, ciliate. Style hairy, purple, gradually thickened to the 3-fid stigma. Ovary inferior, 3—4 mm. long, conical, pointed at the base. Fruit with valves a little shorter than the erect or spreading calyx lobes.

The type is *Thunberg* in herb. Linn. (221.37).

Lower mountain slopes in the south central Cape.

Variable in habit but readily distinguished by the woolly hairs, rolled ericoid leaves, flowers in heads, large corolla, and conical ovary. *L. albanensis* Sond. which was founded on specimens collected by *Zeyher* (S) in Howiesons Poort cannot be separated. The solitary specimen in herb. Sonder is not glabrous as described.

CALEDON. Genadendal, *Schlechter* 7757 (BM): Elandsrivierberg, *Zeyher* (S): Greyton, *Gillett* 883 (BOL).

BREDASDORP. Napier, *Adamson* 4770: Elim, *Adamson* 4777: Bontebok Park, *Compton* 22623 (NBG).

SWELLENDAM. Swellendam, *Bolus* 8070 (BOL, K): *Bowie* 11 (BM): Potteberg, *Adamson* 3914, 4803, 4805, 4807-8: Infanta, *Adamson* 4174 (CT).

RIVERSDALE. Garcias Pass, *Adamson* 4375, 4830, 4836-7, 4843: *Bolus* 2379 (K), s.n. (BOL): Kortefontein, *Hafstrom & Acock* 1988 (PRE): Albertinia, *Adamson* 4849.

PRINCE ALBERT. Swartberg Pass, *Adamson* 4353, 4875, 4878-9, 4882-3, 4886, 4888: *Stokoe* 8657 (BOL).

GEORGE. Camfer, *Adamson* 5182.

KNYSNA. Knysna, *Morris* 387 (NBG): Paardekop, *Morris* 387 (BOL): Keurbooms River, *Compton* 7199 (NBG): Formosa, *Fourcade* 603 (BOL): Plettenburg Bay, *Fourcade* 603 (BOL): Vlugt, *Bolus* 2397 (BOL).

UNIONDALE. Avontuur, *Fourcade* 2076 (BOL): Lauterwater, *Compton* 5220 (NBG): de Hoek, *Esterhuysen* 13675 (BOL, PRE).

HUMANSDORP. Oudebosch, *Fourcade* 1149 (BOL, K): Storms River, *Story* 2424 (PRE): Combrink, *Adamson* 5202: Baviaans Kloof Mts., *Adamson* 5200: Assegaaibosch, *Breyer* (PRE): Krakakama, *Ecklon & Zeyher* (S).

UITENHAGE. Van Stadensberg, *Ecklon* (S): *MacOwan* 2080 (K, SAM): Van Stadens River, *Burchell* 4682 (K): *Ecklon & Zeyher* 2347 (G, SAM): Uitenhage, *Zeyher* 827 (K): Swartkops River, *Ecklon* 2350 (BOL).

ALBANY. Howiesons Poort, *Zeyher* (S): Grahamstown, *Flanagan* 1500 (PRE): Bothasberg, *MacOwan* 1500 (BOL, K).

ALEXANDRIA. Road to Port Elizabeth, *Hafstrom & Acock* 1476 (PRE).

Without locality:—*Alexander* (BM): *Burmann* (G): *Ecklon & Zeyher* (PRE).

23. **L. rubens** Buek in E. & Z. Enum. 373. 1837. *L. angustifolia* A.DC. in DC. Prodr. 7. 418. 1839.

Stems woody, ascending, reddish brown, covered with short spreading hairs, often much branched. Leaves fasciculate, spreading, ericoid rolled, though slightly open-backed, 3—6 mm. long, green, glabrous, mucronate at the tip, usually with 1—2 pairs of sharp teeth near the base. Inflorescence with few or many erecto-patent branches, sometimes corymbose, sometimes almost spike-like. Flowers in groups of 2—3. Bracts like the leaves but less rolled and with longer teeth. Calyx glabrous or nearly so, the lobes revolute-rolled, 2—3 mm. long, usually with slender teeth near the base. Corolla white, purple or brownish outside, 3·5—7 mm. long, the tube less than 1 mm. the lobes slightly widened to the tip, hairy outside but often very thinly so. Bases of the filaments oblong or oblong-spathulate, thinly ciliate. Ovary wider than long, hemispherical below. Fruit wider than long, the valves much shorter than the calyx lobes.

The type is *Ecklon* s.n. from Swartkops River in herb. Sonder (S), the type of *L. angustifolia* is *Drege* 6320 (G).

Rather dry mountain slopes in the southern and south-eastern coastal belt.

The whole plant often becomes reddish-brown in the later phases.

BREDASDORP. Nachtwacht, *C. A. Smith* 4267 (PRE): Napier, *Adamson* 4769.

LADISMITH. Seven Weeks' Poort, *Compton* 8608 (NBG): *Lewis* (SAM).

RIVERSDALE. Garcias Pass, *Adamson* 4824, 4826, 4827: Gouritz River mouth, *Adamson* 4803.

OUDTSHOORN. Montagu Pass (N. side), *Adamson* 5172: Swartberg, *Adamson* 4873.

MOSSEL BAY. Langeberg, *Muir* 1387 (BOL, K, PRE): Mossel Bay, *Guthrie* 4341 (NBG): Great Brak River, *Bolus* 8665 (BOL).

GEORGE. Montagu Pass, *Adamson* 5174-5-6: Camfer, *Esterhuysen* 16792 (BOL, PRE).

UNIONDALE. Avontuur, *Adamson* 5186: *Fourcade* 3230 (PRE): Misgund, *Fourcade* 1347 (BOL): Lauterwater, *Compton* 5216 (BOL, NBG): Wagenbooms River, *Burchell* 4933 (K).

WILLOWMORE. Baviaans Kloof, *Adamson* 5190, 5191, 5192.

HUMANSDORP. Krom River, *Drege* 6320 (G, S): Melk River, *Burchell* 4794 (K): Clarkson, *Thode* A918 (PRE): Krakakama, *Bolus* 1098 (K): *Zeyher* 3133 (SAM): Jeffreys Bay, *Burtt-Davy* 12007 (PRE): *Fourcade* 5918 (BOL).

UITENHAGE. Winterhoek Mts., *Zeyher* 3121 (K, PRE), 3127 (BOL, S, SAM), 3131 (SAM): Van Stadens River, *Zeyher* (SAM): Bethelsdorp, *Zeyher* 3127 (PRE, K, S, SAM): Uitenhage, *Ecklon & Zeyher* 2346 (SAM): *Harvey* (BM): Swartkops River, *Ecklon* (S).

PORT ELIZABETH. Earncliff, *Galpin* 6372 (PRE).

SOMERSET EAST. Zuurberg, *Bolus* 914 (BOL, K): *Long* 1235 (PRE): *Schonland* 3230 (PRE, K).

Without locality:—*Drege* 9138 (S), s.n. (G).

Var. **brachyphylla** Adamson var. nov.

A typo differt foliis brevioribus squarrosis vel recurvatis, corollae tubo longiore, ovario conico basi attenuato.

Stems more hairy and usually less branched. Leaves short, 2—4 mm., shorter than the internodes, spreading or recurved. Flowers almost sessile, in small heads. Calyx lobes ciliate. Corolla tube 2 mm. long, two-thirds the length of the calyx lobes. Bases of the filaments widened or bulged at the sides. Ovary conical, distinctly narrowed to the base. Valves very short.

The type is *Adamson* 4798 (BOL).

Limestone flats near the coast.

BREDASDORP. Kathoek, *Pillans* 9377 (BOL, K, NBG, PRE).

SWELLENDAM. Infanta, *Adamson* 4800: Potteberg, *Adamson* 4796-7-8-9, 4800, 4801.

24. **L. calcarea** Adamson sp. nov.

L. cinereae affinis sed differt caulibus pubescentibus nec lanatis, foliis congestis squarroso-patentibus, floribus corymbosis, bracteis longioribus, ovario turbinato, valvis brevioribus.

Sprawling or procumbent, much branched. Stems covered with short stiff hairs but not woolly. Leaves fasciculate, usually crowded, spreading, squarrose, revolute-rolled, green, 4—8 mm. long, usually glabrous, distinctly narrowed to the base, mucronate at the tip, with 1, 2 or 3 pairs of lateral teeth near the base. Flowers almost sessile, in groups of 2—5, the groups on long or short usually corymbose branches. Bracts like the leaves but longer and more prominently toothed. Calyx lobes rigid, revolute rolled, 2—5 mm. long, with slender teeth near the base. Corolla white, often blue-purple outside, 8—15 mm. long, the tube slightly shorter than the calyx lobes, the lobes glabrous or very thinly hairy. Bases of the filaments oblong or oblong-spathulate, ciliate. Style purple, thickened in the upper part. Ovary inferior, about twice as long as wide, 3—4 mm. long, rounded at the base. Fruit with valves much shorter than the spreading calyx lobes.

The type is *Adamson* 4790 (BOL).

Limestone near the coast in the Bredasdorp-Swellendam region.

Allied to *L. cinerea* but easily distinguished by the absence of woolly hairs, the crowded squarrose toothed leaves, large flowers in heads, longer corolla tube, and rounded ovary.

BREDASDORP. Cape Agulhas, *Esterhuysen* 4424 (BOL, PRE): *Hafstrom & Acock* 2008 (PRE): The Poort, *Adamson* 4788-9, 4790, 4792, 4793-4: *Esterhuysen* 19576 (BOL): *Barker* 7224 (NBG): Rietfontein Poort, *Schlechter* 1475 (PRE), 9683 (BM, G, K, PRE): Brandfontein, *Esterhuysen* 19096 (BOL): Bontebok Park, *Compton* 22152 (NBG): Struys Bay, *Salter* 4101 (BOL): Die Mond, *Martin* 590 (NBG): Elim, *Bolus* 8569 (BOL, K, PRE): *Guthrie* 4461 (NBG): *Stokoe* (SAM).

SWELLENDAM. Infanta, *Adamson* 3789 (CT), 4814, 4818, 4819: Breede River Mouth, *Adamson* 4798.

25. **L. squarrosa** Adamson sp. nov.

Suffrutex erecta ramosa. Folia fasciculata, congesta, squarrosa, ericoidea. Flores terminales subsessiles. Calycis lobi breves. Corollae tubus lobis calycis longior, lobi glabri. Ovarium hemisphaericum.

Stems erect, woody, 25—35 cm. high, much branched. Leaves much crowded, fasciculate, squarrose, ericoid-rolled, 3—5 mm. long, gray-green, ciliate at the base otherwise glabrous, usually toothed at the base. Flowers in groups of 2—5 at the tips of the branches: peduncles hairy, 2 mm. long. Calyx lobes about 2 mm. long, triangular revolute at the edges but not rolled. Corolla white, blue or purple outside, about 6 mm. long, the tube 3 mm., distinctly longer than the calyx lobes, the lobes glabrous. Bases of the filaments elliptical-oblong, densely ciliate. Style hairy, thickened at the tip. Ovary inferior, hemispherical, as wide as long, about 2 mm., hairy. Fruit valves about as long as the calyx lobes.

The type is *Levyns* 8822 (CT).

Rare on limestones at low levels.

Allied to *L. calcarea* but differing in habit, colour, the short calyx lobes which are not rolled, long corolla tube, and ovary as wide as long.

BREDASDORP. The Poort, *Levyns* 8822 (CT).

RIVERSDALE. Riversdale, *Muir* 2627 (PRE).

Ser. 8. **Tenellae** v. Brehm. l.c.

Shrublets. Leaves alternate or rarely opposite, usually thick, concave above, reflexed or recurved, usually fasciculate. Flowers often umbellate. Corolla with a very short tube. Ovary 3- or 2-chambered, ranging from superior to quite inferior.

The type species is *L. tenella* Lodd.

Key to the Species.

1. Ovary inferior, the lower part as long as or longer than wide.
    2. Woody, more or less erect.
        3. Flowers in heads: bracts longer than the pedicels: ovary conical, pointed at the base .. .. *fasciculata*

3. Flowers not in heads: bracts shorter than the pedicels: ovary not pointed at the base.
4. Leaves reflexed.
5. Leaves thick, concave above .. .. .. *diffusa*
5. Leaves not thickened, flat.
6. Leaves alternate: flowers small, in a branched inflorescence .. .. *diffusa* var. *Stokoei*
6. Leaves opposite: flowers large, umbellate .. *umbellata*
4. Leaves squarrose-recurved: inflorescence lax .. *diffusa* var. *palustris*

2. Almost herbaceous, prostrate or sprawling.
7. Hispid: leaves not fasciculate, toothed: inflorescence branched .. .. *planifolia*
7. Glabrous or with very short hairs: leaves fasciculate: flowers few, terminal or axillary .. .. .. *tenella* var. *montana*

1. Ovary less than half inferior, the lower part as wide as or wider than long.
8. Ovary almost superior .. .. *intricata*
8. Ovary partly inferior.
9. Slender, sprawling: inflorescence raceme-like: flowers blue .. .. *tenella*
9. Woody, erect: flowers white.
10. Leaves reflexed, longer than wide: flowers mostly solitary .. .. *nodosa*
10. Leaves squarrose, mostly recurved.
11. Leaves very small, not recurved: flowers solitary or raceme-like .. .. *pauciflora*
11. Leaves as wide as long, recurved: flowers umbellate.
12. Tall: leaves scattered, 1·5—3 mm. long: valves in fruit shorter than the calyx lobes *rigida*
12. Low-growing: leaves crowded, 1 mm. long: valves in fruit longer than the calyx lobes.. . *microphylla*

26. **L. fasciculata** (L.f.) A.DC. Monog. Camp. 112. 1830. *Campanula fasciculata* L.f. Supp. Pl. 139. 1781.

Stems woody, up to 80 cm. high, solitary, erect, branched from the base or in the upper parts, the younger brown, hispidulous or almost glabrous. Leaves alternate, fasciculate, reflexed, ovate or ovate-lanceolate, 3—5 mm. long, 1·3—2·5 mm. wide, thick, concave above, acute, glabrous or with a few hairs on the underside, entire or minutely toothed at the base. Leaves crowded or distant in the upper parts. Flowers in terminal heads with 2 to many flowers. Bracts flat, rather thin, acute, toothed, 0·5—1·5 cm. long, hairy on the midrib, much longer than the pedicels, usually longer than the flowers. Pedicels hispid, 1—3 mm. long. Calyx lobes 3—6 mm. long, narrow, acuminate, toothed, usually revolute at the edges. Corolla 6—10 mm. long, white but blue or purple outside, the tube very short, the lobes narrow, spreading, hairy on the mid line outside. Bases of the filaments oblong, acute, with lateral bulges, finely ciliate. Style hairy: stigma 3-fid. Ovary inferior, 2—4 mm. long, pointed at the base. Fruit obconical, the valves shorter than the calyx lobes.

The type is in herb. *Thunberg*, Uppsala.

Lower mountain slopes in the central south coastal belt.

In the past this species has been much confused with forms of *L. diffusa* with aggregated flowers. The bracts are quite characteristic.

RIVERSDALE. Langeberg, *Muir* 1389 (BOL), 1433 (PRE): Garcias Pass, *Adamson* 4377, 4839, 4841, 4842, 4845: *Esterhuysen* 17229 (BOL): Albertinia, *Adamson* 4851, 4854 (PRE): Gouritz River Mouth, *Adamson* 4857.

MOSSEL BAY. Mossel Bay, *Adamson* 4968: *Burchell* 6314 (K): *Moran* (BOL): Langeberg, *Muir* 1384 (K), 1389 (PRE): Cloetes Pass, *Adamson* 4338: *Zinn* (SAM): Eightbells, *Adamson* 4870: Reutersbosch, *Adamson* 4871: *Van Niekerk* 114 (BOL).

GEORGE. George, *Bolus* (BOL): *Hutchinson* 1272 (K): *Prior* (K): Zwart River, *Fourcade* 6380 (BOL): Camfer, *Esterhuysen* 13316 (PRE).

KNYSNA. Belvedere, *Duthie* 813 (BOL): Knysna, *Breyer* (PRE): Heads, *Martin* 387 (NBG): Gouna, *Keet* 957 (PRE): Nutzie, *Keet* 677: Plettenburg Bay, *Pappe* (K, S, SAM): Keurbooms River, *Fourcade* 184 (BOL): Groot River, *Fourcade* 1167 (BOL).

UNIONDALE. Prince Alfreds Pass, *Stokoe* (SAM).

LADISMITH. Seven Weeks Poort, *Stokoe* 8997 (BOL).

OUDTSHOORN. Swartberg Pass, *Adamson* 4361: *Stokoe* 1751 (PRE), s.n. (SAM).

Without locality:—*Drege* (G): *Moricaud* (G): *Oldenburg* 714 (BM): *Verreaux* (G).

27. **L. diffusa** Buek in E. & Z. Enum. 376. 1837. *L. tenella* A.DC. Monog. Camp. 111. t.3B. 1830. p.pte. *non* Lodd. *L. tenella* var. *brevivalvis* A.DC. in DC. Prodr. 7. 418. 1839. p.pte. *Campanula tenella* L.f Supp. Pl. 139. 1781.

An erect or sprawling branched shrublet, 15—50 cm. high. Stems shortly hairy. Leaves alternate, fasciculate, reflexed, crowded or distant all along, ovate to ovate-lanceolate, 2—5 mm. long, 1—4 mm. wide, acute, thick, concave above, the edges thickened, entire or with a few very minute teeth at the base. Flowers usually in groups of 3, sometimes aggregated at the stem tip, sometimes lateral, sometimes lax. Pedicels from minute to 1·3 cm. long, hairy. Bracts like the leaves but much smaller. Calyx lobes 2—3 mm. long, acute, involute, minutely toothed at the base. Corolla white, blue or purple outside, 5—8 mm. long, the tube very short, the lobes narrow, spreading, glabrous, slightly cucullate at the tip. Bases of the filaments obovate, truncate or almost 3-lobed, shortly but densely ciliate. Style blue, distinctly thickened at the top. Ovary more than half inferior, hemispherical below, occasionally flattened or slightly pointed at the base, usually glabrous. Fruit 2—3 mm. long, 2 mm.

diameter: valves about as long as or very slightly longer than the calyx lobes.

The type is *Zeyher* s.n. in herb. Sonder, (S), the type of *Campanula tenella* is in herb. Linn. (221.25).

Common at low altitudes, especially on sand, in the S.W. coastal belt.

Variable in habit, amount of branching, and in the grouping of the flowers and length of the pedicels. While extreme forms look distinct they are connected by intermediates. The species is recognised by the thick reflexed leaves, the very short corolla tube, and the inferior almost hemispherical ovary.

This species has most commonly been named "*L. tenella* A.DC." but that name is invalid. Following Sonder (Fl. Cap. 3. 562. 1865), who used that name for an aggregate species which is now segregated, there has been a good deal of confusion. The present species is undoubtedly that named *Campanula tenella* by Linnaeus fil., but the combination under *Lightfootia* is antedated by Loddiges who depicted another plant. Buek, who was the first to attempt segregation of the complex, gave a rather poor description but the type specimen of his *L. diffusa*, *Zeyher* s.n. (S), is certainly identical with the Linnean specimen though a rather xeromorphic form. A. De Candolle's figure also represents a form of this species but the only specimens of it in his herbarium are placed under varieties. (cf. also under *L. tenella* Lodd.)

CAPE. Strandfontein, *Adamson* 4766 (PRE): *Compton* 12796 (NBG): Doornhoogte, *Ecklon & Zeyher* 2354 (G, SAM), 2355 (BOL, G, SAM): Vygeskraal, *Guthrie* 1248 (CT): Cape Town, *Bolus* 7291 (BOL): *Ecklon* (BM), 156 (G): *Prior* (K): Camps Bay, *Moss* 1617 (BM), 7562 (BM): Little Lion's Head, *Compton* 18581 (NBG): Hout Bay, *Bond* 118 (NBG): *Galpin* 4306 (PRE): Rondebosch, *Wolley-Dod* 185 (K): Wynberg, *Zeyher* 3126 (S, SAM): Lakeside, *Adamson* 1363 (CT): Muizenberg, *Adamson* 5225: *Moss* 7529 (BM): Fishhoek, *Young* (PRE): Simonstown, *Wolley-Dod* 648 (BM, BOL, K): Witsands, *Compton* 10619 (NBG): Theefontein, *Compton* 21859 (NBG): Matrooskop, *Adamson* 2461 (BOL): Buffels Bay, *L. Bolus* (CT): *Compton* 6358, 12578 (NBG): Cape Point, *L. Bolus* (CT): *Compton* 12517 (NBG): *Salter* 291/20 (BM).

STELLENBOSCH. Kuils River, *Pappe* (SAM): *Salter* 4923 (BM, K): *Zeyher* (S).

WORCESTER. Karroo Garlen, *Cross* 50 (NBG): Pieter Meintjies, *Rogers* 17898 (G).

CALEDON. Rooi Els, *Adamson* 4699: *Parker* 4176 (NBG): Hangklip, *Stokoe* (SAM): Pringle Bay, *Adamson* 4698: Gans Baai, *Stokoe* (SAM).

BREDASDORP. Napier, *Adamson* 4771: Baardscheermansbosch, *Stokoe* (SAM): Struys Bay, *Esterhuysen* 4441 (BOL): Ratel River, *Adamson* 4787.

SWELLENDAM. Clock Peaks, *Wurts* 127 (NBG): Infanta, *Adamson* 4811, 4816.

HEIDELBERG. Lemoenshoek, *Stokoe* (SAM).

LADISMITH. Ladismith, *Levyns* 2069 (CT).

RIVERSDALE. Riversdale, *Bolus* 11326 (K, PRE): Windvogelberg, *Drege* (CGE, G).

WILLOWMORE. Baviaans Kloof, *Adamson* 5221.

UNIONDALE. Avontuur, *Adamson* 5184, 5185, 5186A.

MOSSEL BAY. Dwyka River, *Burchell* 6398 (K).

UITENHAGE. Swartkops River, *Ecklon & Zeyher* (SAM).

PORT ELIZABETH. Port Elizabeth, *Forbes* (CGE, K): *Harvey* (K).

ALEXANDRIA. Sundays River, *Ecklon & Zeyher* 2353 (SAM).

ALBANY. Howiesons Poort, *Zeyher* 3119 (S): Grahamstown, *Galpin* 199 (PRE): Bothas Hill, *Dyer* 1450 (PRE).

KEISKAMA. Keiskama Hoek, *Sim* (PRE).

QUEENSTOWN. Finehans Nek, *Galpin* 1791 (PRE).

"Between Cape Town and George". *Rogers* (BM).

Without locality:—*Burmann* (G): *Ecklon* 156 (K, S): *Ecklon & Zeyher* 2356 (PRE), s.n. (S): *Elliot* (G): *Harvey* (BM, K): *Masson* (BM): *E. P. Phillips* (PRE): *Roxburgh* (K): *Ryder* (K): *Sparrmann* (S): *Verreaux* (G).

Var. **palustris** Adamson var. nov.

A typo differt caulibus tenuioribus laxe ramosis, foliis distantibus, floribus subsolitariis pedicellis longis, fructibus minoribus.

Tall, slender, with lax ascending branches. Leaves distant, ovate-oblong, 1—3 mm. long, 0·5—1 mm. wide, reflexed or recurved. Flowers few, at the tips of the branches, on slender pedicels 0·7—1 cm. long. Calyx lobes 2 mm. long, not or very minutely revolute. Corolla white, the lobes with blue tips outside, glabrous. Bases of the filaments longer and less truncate. Ovary smooth, 1 mm. long. Fruit 1·5 mm. long and wide, the valves slightly shorter than the calyx lobes.

The type is *Adamson* 4821 (BOL).

Damp places by streams or on peat in the central Langeberg.

Very distinct in habit and in the elongated lax pedicels.

SWELLENDAM. Tradouw Pass, *Adamson* 4821, 4822 (PRE): *Compton* 8579 (PRE): *Lewis* (SAM): Lemoenshoek Mts., *Stokoe* (SAM): Mts. near Swellendam, *O. Kuntze* (K).

RIVERSDALE. Langeberg, *Muir* 2626 (PRE): Garcias Pass, *Esterhuysen* 17328 (BOL, K).

Without locality:—*Bowie* 2 (BM).

Var. **Stokoei** Adamson var. nov.

A typo differt foliis lineari-oblongis planis haud incrassatis marginibus revolutis, floribus minoribus, fructibus 2 vel 3 locularibus, valvis longioribus.

Smaller and more slender than the typical form. Leaves alternate, linear-oblong, 3—8 mm. long, 1·5—2 mm. wide, not thickened, the edges revolute. Inflorescence lax, with slender branches. Pedicels 0·4—1 cm. long. Calyx lobes less than 1 mm. long. Bases of the filaments rhombic-oval, acute, ciliate. Ovary inferior, rounded at the base, usually hairy, 2- or 3-chambered. Fruit 1—3 mm. long and wide, the valves 2 to 3 times as long as the calyx lobes.

The type is *Stokoe* 8658 (BOL).

Rare on mountains in the Caledon-Bredasdorp areas.

CALEDON. Palmiet River, *Stokoe* 8658 (BOL): Gans Baai, *Stokoe* 7547 (BOL): Genadendal, *Burchell* 8634 (K): Baviaans Kloof, *Burchell* 7849, 7882 (K).

BREDASDORP. Baardscheerdersbosch, *Stokoe* (SAM).

28. **L. umbellata** Adamson sp. nov.

Suffrutex *L. diffuso* affinis sed differt foliis oppositis lineari-lanceolatis distantibus. Floribus majoribus umbellatis, fructibus majoribus valvis lobis calycis multo brevioribus.

A branched erect or sprawling shrublet 30—50 cm. high. Young stems gray, ridged, shortly hairy. Leaves opposite or mostly so, reflexed, distant, usually not fasciculate, linear-lanceolate, 5—8 mm. long, 1—2 mm. wide, more or less concave above. Leaves shorter than the internodes. Inflorescence a terminal cymose umbel. Pedicels 3—6 mm. long, hispid at least when young. Calyx lobes 2—3 mm. long, lanceolate, acute, slightly revolute. Corolla white, blue or purplish outside, the tube very short, the lobes 6—8 mm. long. Style distinctly and rather abruptly thickened below the stigma. Ovary inferior, hispid when young. Fruit almost hemispherical, 2·5—4 mm. long, 3—5 mm. diameter, rounded or slightly retuse at the base, glabrescent but rough. Valves subobtuse, less than half as long as the calyx lobes and much shorter than the lower part.

The type is *Acocks* 15195 (K).

Sand at low levels near Clanwilliam.

Allied to *L. diffusa* but distinguished by the distant opposite narrow leaves, large flowers in a terminal umbel, and the large fruit with long calyx lobes and short valves.

CLANWILLIAM. Lamberts Bay, *Acocks* 15195 (K, PRE).

29. **L. nodosa** Buek in E. & Z. Enum. 376. 1837. *L. tenella* var. *longivalvis* A.DC. in DC. Prodr. 7. 418. 1839. *L. tenella* var. *microphylla* Sond. Fl. Cap. 3. 362. 1865. *L. tenella* var. *rigida* Sond. l.c. p.pte.

A rigid much branched diffuse or erect shrublet, up to 50 cm. high though commonly 15—30 cm., the branches often divaricate, the younger white or pale-coloured. Leaves alternate, fasciculate, reflexed, often distant, rather thick, ovate-lanceolate, 2—6 mm. long, 1—1·5 mm. wide, acute, concave above, the edges entire or with minute teeth. Inflorescence with rigid spreading branches, often spinous in the later phases. Flowers solitary, 1—5 to a branch, on slender pedicels 3—7 mm. long. Calyx lobes 2—3 mm. long, acute or mucronate. Corolla white, fading to yellow, often brownish outside, 5—8 mm. long, the tube very short, the lobes glabrous. Bases of the filaments ovate to lozenge-shaped, densely ciliate. Style blue, longer than the corolla, shortly hairy, gradually thickened to the top: stigma lobes 3, very short. Ovary less than half inferior, the lower part rounded or flattened, less than 1 mm. long, about 1·5 mm. diam. Fruit 5-ribbed, broader than long: valves as long as the calyx lobes, twice as long as the lower part.

The type is *Ecklon* s.n. (Port Elizabeth) in herb. Sonder, (S).

Rocky places in rather dry regions, especially on hills in and around the karroo.

The commonest and most wide-spread species. Rather variable in habit and in the branching of the inflorescence. Distinguished by the small reflexed leaves, the branched inflorescence, and half superior ovary. The leaves on the main stem often fall, only the axillary fascicles persisting. In the past much confused with *L. tenella* and *L. diffusa*, indeed Ecklon & Zeyher issued specimens under the latter name.

CALVINIA. Hantamsberg, *Drege* 6317a (S).

BARKLY WEST. Alexandersfontein, *Moran* (SAM): Smiths Mine, *Acocks* 111 (PRE): Daniels Kuil, *Esterhuysen* (BOL).

HAY. Griquatown, *Brueckner* 1058 (PRE): *Burchell* 1886 (K): Malansrust, *Acocks* 321 (PRE): Dunmurray, *Wilman* (SAM).

KIMBERLEY. Kimberley, *Acocks* 1621 (K): *Hutchinson* 3000 (BOL, K): *Wilman* (PRE): *Brueckner* 860 (PRE): *Marloth* 749 (PRE).

CARNARVON. Kareeberg, *Burchell* 1575 (K).

WILLISTON. Walkraal, *Acocks* 9635 (PRE): *Foley* 180 (PRE).

SUTHERLAND. Sutherland, *Compton* 19490 (NBG): Middelpost, *Lewis* (SAM): Riet Vlei, *Burchell* 1381 (K).

PHILLIPSTOWN. Orange River, *Burchell* 2675 (K, PRE): Barens River, *Burchell* 1381 (K): Potfontein, *Sidey* 76 (PRE).

DE AAR. Quaggafontein, *Story* 1079 (PRE): Potfontein, *Schweicherdt* 1197 (PRE).

COLESBURG. Colesburg, *Shaw* (K).

RICHMOND. Afrikashoogte, *Burke* (BM): *Zeyher* 1063 (CGE, G, K, SAM, BM).

MIDDELBURG. Grootfontein, *Theron* 722 (K, PRE): *Verdoorn* 1514 (PRE), 1736 (K, PRE), s.n. (BOL): Bangor Farm, *Bolus* (BOL): Middelburg, *Gill* 78 (PRE): Wapadsberg, *Adamson* 5282.

GRAAFF-REINET. Graaff-Reinet, *Bolus* (BOL): 15 (S): Oudeberg, *Bolus* 9 p.pte (BOL).

MURRAYSBURG. Murraysburg, *Tyson* 110 (BM): Koudeberg, *Adamson* 5197.

PEARSTON. Riet Vlei, *Story* 76 (PRE).

CRADOCK. Cradock, *Brynard* 303 (PRE): Gt. Fish River, *Zeyher* 1061 (BM, K, SAM).

MARAISBURG. Swartkei, *Baur* 991 (K).

SOMERSET EAST. Zuurberg, *Drege* (G, S).

QUEENSTOWN. Queenstown, *Galpin* 1791 (K): Shiloh, *Drege* (S): Camdeboosberg, *Drege* (S).

BEAUFORT WEST. Beaufort West, *Esterhuysen* 2373 (BOL): Rhenosterkop, *Burke & Zeyher* (K): *Zeyher* 1062 (BM, K, SAM): Nieuwveld, *Adamson* 5213, 5215-6-7-8-9-20: Nelspoort, *Pearson* 2099 (SAM).

LAINGSBURG. Witteberg, *Compton* 2653 (BOL), 2654 (NBG), 2785 (BOL): Rietvlei Kloof, *Compton* 8626 (NBG): Pietermeintjes, *Rogers* 17898 (PRE).

WORCESTER. Bonteberg, *Compton* 9946 (NBG): *Esterhuysen* 3653 (BOL, PRE): Karroo Garden, *Compton* 18280 (NBG): *Cross* 50 (NBG):

CERES. Visgat, *Stokoe* (SAM).

CALEDON. Genadendal, *Drege* (G).

LADISMITH. Huis River Mts., *Bond* 250 (NBG): Seven Weeks Poort, *Andreae* 1320 (PRE).

RIVERSDALE. Muiskraal, *Adamson* 4823, 4825 (PRE).

UITENHAGE. Zuurberg, *Drege* (K): Swartkops River, *Ecklon & Zeyher* 2358 (SAM): *Zeyher* 1008 (SAM), 2348 (BOL), 3128 (K, S, SAM): Uitenhage, *Harvey* 1008 (BM, CGE): Addo, *Ecklon* (S): *Long* 800 (PRE): *Ecklon & Zeyher* 2.11 (S): *Zeyher* 3119 (S).

PORT ELIZABETH. Port Elizabeth, *Ecklon* (S): *Long* 800 (K).

ALBANY. Grahamstown, *Daly & Sole* 360 (BM, PRE): *Hutchinson* 1596 (BOL, K, PRE): *MacOwan* 953 (BM, S, SAM), 1133 (K): *Rogers* 1516 (BM, K, SAM).

O.F.S.:

FAURESMITH. Fauresmith, *Henrici* 2901, 2947 (K, PRE): *Pole-Evans* 1621 (PRE): *C. A. Smith* 5271, 5351, 5593A (PRE): Luckhoff, *Pole-Evans* s.n. (K), H13572 (PRE).

BLOEMFONTEIN. Bloemfontein, *Potts* 1896 (BM).

TRANSVAAL:

PRETORIA. Olifantsfontein, *Rehmann* 1465 (NBG): Hebron, *Flanagan* 1465 (NBG).

Without locality:—*Drege* 6308 (G, K, S): *Ecklon & Zeyher* 2357 (BM, G): *Harvey* (K): *Prior* (K): *Thunberg* (BM).

Also occurs in S.W. Africa.

30. **L. intricata** Dinter & Markgraf Bot. Notiz. Berlin 15. 467. 1941: 789. 1942: Bot. Jahrb. 75. 209. 1950. *L. Dinteri* Diels Fedde Rep. 18. 438. 1922. *non* Engl.

A compact much branched shrublet, 20—50 cm. high, usually gray-green. Leaves fasciculate, usually much crowded and completely hiding the stem rarely scattered, thick, 3—5 mm. long. Flowers solitary on rigid branches with scattered small leaves, the branches finally spinous. Calyx roughly hairy. Corolla white, translucent. Ovary superior, 3- or 4-chambered, flat at the base. Valves in fruit longer than the calyx lobes.

The type is *Dinter* 1471.

Rocky places at low altitudes in S.W. Africa and northern Namaqualand.

Like *L. nodosa* but with more crowded leaves and a superior ovary. Where the leaves are separated they are reflexed otherwise squarrose.

NAMAQUALAND. Elizabeth Bay, *Marloth* 4811 (PRE).

S.W. AFRICA. Lichtenstein, *Dinter* 3497 (BM, BOL, K, PRE): Aus, *Dinter* 6068 (BM, BOL, G, K, PRE): Gt. Karasberg, *Pearson* 8552 (K): Gucheb, *Schonfelder* 953 (PRE).

31. **L. tenella** Lodd. Bot. Cab. t.1038. 1825. *L. tenella* A.DC. Monog. Camp. 111. 1830. p.pte. *L. Loddigesii* A.DC. l.c. 114. *L. tenerrima* Buek in E. & Z. Enum. 375. 1837. *L. tenella* var. *tenerrima* Sond. Fl. Cap. 3. 567. 1865.

A diffuse or sprawling much branched shrublet, rarely erect. Stems slender, up to 50 cm. long, brown, shortly hairy. Leaves alternate, fasciculate, reflexed, lanceolate to ovate-lanceolate, 3—5 mm. long, 1—1·5 mm. wide, acute or acuminate, rather thick, concave above, usually entire. Leaves most commonly distant and shorter than the internodes. Flowering branches long, slender, often branched, the flowers not crowded, in a raceme-like inflorescence. Flowers solitary or paired: bracts very small: pedicels hairy, ranging from very short to 2·5 mm. long. Calyx lobes 1·5—2 mm. long, triangular-acute, slightly keeled, the edges slightly revolute. Corolla blue or blue-purple, rarely white, 5—8 mm. long, the tube very short, the lobes narrow, glabrous. Bases of the filaments broadly rhombic, ciliate especially on the obtuse angles. Style deep blue, gradually thickened to the top. Ovary half-inferior, shortly hairy, the lower part rounded, 1 mm. deep, 2 mm. diameter. Fruit 3—4 mm. diameter, 1·5—2 mm long, distinctly ridged: valves 2—3 mm. long, longer than the spreading calyx lobes.

The type is *Lodd.* l.c. t.1038: that of *L. tenerrima* is *Zeyher* 3125 (S).

Dry stony or rocky places on low hills on the southern coastal belt.

There has been confusion in the application of the name of this species. Loddiges' plate delineates a single branch. His description is inadequate and there is no extant specimen. Careful comparison of the plate with specimens, however, leaves no doubt that it represents the same plant as *Zeyher* 3125, the type of *L. tenerrima* Buek, or *Drege* 6316 which was A. De Candolle's type of his *L. tenella*. This identification is supported by Loddiges' statements that the leaves of his plant are "deeply channelled" and that it might be confused with *L. oxycoccoides*. The last might conceivably occur with dried specimens but seems most unlikely with fresh ones.

In 1830 A. De Candolle renamed Loddiges' plant because he found it was not identical with the original *Campanula tenella* L.f. Unfortunately he retained the name, *L. tenella*, and redescribed it, though his description is based on two species. Part of it, and his figure, refers to *L. diffusa*. The only specimen in his herbarium, *Drege* 6316, is certainly the basis of the larger part of his description and is his type. This specimen is identical with *Zeyher* 3125, the type of *L. tenerrima*. It is to be noted that all the other specimens in A. De Candolle's herbarium are placed under varieties.

Sonder (l.c.) added to the existing confusion by treating *L. Loddigesii* as a synonym of his *L. ciliata* (*L. divaricata*). The species he described as *L. tenella* A.DC. is an aggregate made up for the most part of *L. diffusa*. He referred the plant represented by *Drege* 6316 and *Zeyher* 3125 to a variety.

CERES. Mitchell's Pass, *Bolus* (BM).

WORCESTER. Worcester, *Fine* G109 (PRE).

CALEDON. Palmiet River, *Bolus* 11585 (PRE): Hermanus, *Rogers* 26606 (PRE): Dasberg, *Stokoe* (SAM).

BREDASDORP. Cupidoskraal, *Adamson* 4326.

SWELLENDAM. Potteberg, *David* (BOL, NBG): Rietkuil, *Zeyher* 3125 (K, S, SAM): Zuurbraak, *Galpin* 4304 (PRE).

MONTAGU. Kogmans Kloof, *Ecklon & Zeyher* 94.12 (S): Coo, *Compton* 10275 (NBG): Road to Barrydale, *Walgate* (BOL).

LADISMITH. Roodeberg, *Adamson* 5170: Seven Weeks Poort, *Primos* 70 (PRE).

HEIDELBERG. Heidelberg, *Ecklon & Zeyher* (S): *Pappe* (SAM).

RIVERSDALE. Riversdale, *Bolus* 11326 (BOL, K): *Muir* 2629 (PRE): *Schlechter* 1889 (CGE), 2474 (PRE): *Pappe* (K).

OUDTSHOORN. Outeniqua Mts., *Esterhuysen* 19505 (BOL, PRE): Swartberg Pass, *Bolus* 11585 (BOL, PRE).

PRINCE ALBERT. Road to Klaarstroom, *Leipoldt* (BOL).

UNIONDALE. Avontuur, *Schonland* 3364 (PRE): Braak Kloof, *Bolus* (BOL): Uniondale Kloof, *Adamson* 5187: Haarlem, *Fourcade* 6242 (BOL): Prince Alfred's Pass, *Stokoe* (SAM): Mannetjeberg, *Esterhuysen* 6480 (BOL): Kamanassie, *Esterhuysen* 16488 (BOL).

WILLOWMORE. Baviaans Kloof, *Adamson* 5194.

MURRAYSBURG. Murraysburg, *Tyson* 110 (SAM).

HUMANSDORP. Kouga Hills, *Esterhuysen* 6691 (BOL).

UITENHAGE. Swartkops River, *Ecklon & Zeyher* 2350 (BOL): (S): Uitenhage, *Harvey* (K).

PORT ELIZABETH. Redhouse, *Paterson* 323 (BOL): Sundays River, *Bolus* 9 p.pte (BOL): Coega, *Rogers* 1342 (PRE).

SOMERSET EAST. Zuurberg, *Drege* 6316 (G): Windvogelberg, *Drege* (S).

Var. **montana** Adamson var. nov.

A typo differt caulibus tenuioribus herbaceis, foliis planis, floribus paucis albis, ovario infero.

Stems sprawling or prostrate, herbaceous or woody at the base only. Leaves not thickened, flat, usually toothed. Flowers few, on long slender branches: pedicels 0·5 cm. long. Corolla white, blue or purple outside. Bases of the filaments ovate-acuminate, densely ciliate. Ovary almost wholly inferior, hemispherical or pointed at the base.

The type is *Adamson* 4889 (BOL).

Rocks on mountain tops. Only found on the summit of the Swartberg Pass. *Adamson* 4889.

32. **L. rigida** Adamson sp. nov.

Frutex erecta. Folia alterna rigida squarroso-recurvata non fasciculata. Flores subumbellati raro solitarii pedicellis rigidis tandem spinescentibus. Corollae tubus perbrevis. Ovarium semi-inferum, triloculare. Valvae fructus lobis calycis breviores.

A rather stout erect rigid branching shrublet, up to 60 cm. high, the branches ascending. Stems gray-brown, shortly pubescent. Leaves alternate, mostly not fasciculate, rigid, squarrose-recurved, 1·5—3 mm. long, 1—2 mm. wide, rather thick, acute or shortly mucronate at the tip, the edges thickened, entire. Leaves crowded on the lower parts and lateral branches but distant on the flowering branches. Flowers terminal, occasionally solitary, more often in umbel-like groups with rigid finally spinous branches 0·5—2 cm. long: pedicels 0·2—0·4 cm. long. Calyx lobes acute, 2—2·5 mm. long, usually revolute at the edges. Corolla white, blue or purple outside, 5—7 mm. long: tube very short: lobes hairy at the tips and on the middle line. Bases of the filaments elliptic-rhombic, acute, densely ciliate on the lateral bulges. Style blue, thickened at the top. Ovary half-inferior, usually hairy. Valves in fruit 2 mm. long, shorter than the calyx lobes, as long as or longer than the lower part.

The type is *Adamson* 5169 (BOL).

Dry rocky mountain slopes, especially on ranges near the margin of sclerophyll vegetation.

Taller, stouter and more rigid than most of the species. Distinctive in habit, leaf, and inflorescence. Previously confused with *L. nodosa* and *L. diffusa*.

CERES. Cold Bokkeveld, Klein Vlei, *Schlechter* 10202 (BM, G, K, PRE): Elands Kloof, *Levyns* 5115 (CT): Rosendalfontein, *Pillans* 9692 (BOL): Schurfteberg, *Pillans* 9594, 9695 (BOL): *Schlechter* 1995 (PRE).

WORCESTER. Matroosberg, *Phillips* 2013 (SAM): Onklaarberg, *Stokoe* (PRE): Karadouw Mt., *Esterhuysen* 10911 (BOL).

LAINGSBURG. Witteberg, *Compton* 2765 (K).

MONTAGU. Wagonboomsberg, *Adamson* 5101.

CALEDON. Bosjesveld Mts., *Stokoe* 7582 (BOL): Genadendal, *Burchell* 7845 (K).

SWELLENDAM. Pottcberg, *Adamson* 4806.

LADISMITH. Roodeberg, *Adamson* 5169: *Compton* 3848 (BOL): *Lewis* (SAM).

PRINCE ALBERT. Swartberg Pass, *Adamson* 4876, 4881, 4995 (PRE): *Bolus* 11586 (BOL): *Stokoe* 8656 (BOL), s.n. (PRE, SAM).

WILLOWMORE. Baviaanskloof, *Adamson* 5193.

MOSSEL BAY. Dwyka River, *Burchell* 6398 (K).

UNIONDALE. Uniondale, *Bolus* 9 (K): s.n. (BOL): Hot Springs, *Esterhuysen* 6274 (BOL): Joubertinia, *Fourcade* 5071 (BOL): Smutsberg, *Esterhuysen* 10756 (BOL): Slypsteenberg, *Esterhuysen* 6667 (BOL): De Hoek, *Esterhuysen* 10648 (BOL).

HUMANSDORP. Zuur Anysberg, *Fourcade* 3030 (BOL): Kouga Hills, *Esterhuysen* 10795 (BOL): *Fourcade* 5071 (BOL, K): Quagga, *Story* 2324 (PRE).

UITENHAGE. Uitenhage, *Harvey* (K).

Without locality:—*Drege* 6318 (S): *Sieber* (S): *Sparrmann* (S).

33. **L. microphylla** Adamson sp. nov.

Suffrutex ramosissima, ramis pedicellis ovariisque brevissime puberulis. Folia parva congesta squarroso-recurvata vix reflexa. Flores terminales solitarii in ramis brevibus subumbellatis positi. Tubus corollae perbrevis. Filamentorum bases cruciformes. Ovarium semi-inferum triloculare. Valvae calycis lobis duplo longiores.

A low much-branched woody shrublet up to 25 cm. high. Stems, pedicels and ovaries covered with very short hairs. Leaves crowded, small, 1—2 mm. long and about as wide, squarrose-recurved, not reflexed, rigid, thick, concave above. Flowers solitary on short branches in a terminal umbellate group. Pedicels rigid, 3—5 mm. long. Calyx lobes thick, triangular, acute, 1 mm. long, usually spreading. Corolla 5—6 mm. long, white, blue or purplish outside, the tube very short, the lobes spreading, glabrous. Bases of the filaments cruciform, shortly ciliate. Ovary 3-chambered, less than half inferior. Fruit 1—1·5 mm. long, 1·5—2 mm. diameter, narrowed to the base: valves twice as long as the calyx lobes.

The type is *Maguire* 834 (NBG).

Sandy soils at low altitudes. Only found in the Bontebok Park, Bredasdorp, *Maguire* 834 (NBG).

A distinctive species usually bluish-green in colour. Leaves almost completely hiding the stems. Distinguished by the very small squarrose leaves, very short calyx lobes, cruciform filaments, and semi-inferior ovary with valves much longer than the calyx lobes.

34. **L. pauciflora** Adamson sp. nov.

Suffrutex diffusa ramosissima ramis ascendentibus. Folia parva, alterna fasciculata distantia. Flores pauci laxe racemosi pedicellis foliis longioribus. Corolla alba tubo perbreve. Ovarium semisuperum, basi rotundatum. Valvae lobis calycis longiores.

A slender wiry erect much branched shrublet up to 40 cm. high. Branches ascending, shortly pubescent. Leaves fasciculate, alternate, scattered, very short, 1·3—2 mm. long, spreading, rather thick, flat or slightly concave above, bulged below, entire or obscurely toothed at the base. Flowers few, 1—3, terminal and in the uppermost axils of very slender branches: pedicels 4—8 mm. long, often with a very small leaf. Calyx lobes 1·5 mm. long. Corolla white, blue outside, 4 mm. long, the lobes narrow, hairy, the tube very short. Bases of the filaments oblong, acute, thinly ciliate. Style hairy, gradually thickened upwards. Ovary half-inferior, the lower part rounded. Fruit 1·5 mm. diameter, less than 1 mm. long: valves 1·5—2 mm. long, distinctly longer than the calyx lobes.

The type is *Adamson* 4832 (BOL).

Sandy flat on mountains. Confined to the northern side of the Langeberg near Riversdale.

A distinctive species in habit, very small leaves, few flowers, half superior ovary and long valves in the fruit.

RIVERSDALE. Garcias Pass, *Adamson* 4370, 4832.

35. **L. planifolia** Adamson sp. nov.

Caules procumbentes hispidi pauciramosi. Folia alterna non fasciculata plana denticulata. Inflorescentia ramosa ramis tenuibus paucifloris. Calycis lobi denticulati marginibus hyalinis. Corollae tubus perbrevis. Ovarium hispidulum turbinatum. Valvae lobis calycis brevioribus.

Slender, prostrate or sprawling, woody at the base only. Stems hispid, up to 40 cm. long. Leaves alternate, not fasciculate, spreading or partly reflexed, flat, ovate-oblong, 4—5 mm. long, 2—3 mm. wide, subcordate at the base, acute, the edges toothed, thickened, and slightly revolute. Inflorescence with slender branches 2—3 cm. long: pedicels 5—8 mm. long. Calyx and ovary hispid. Calyx lobes 2 mm. long, the edges toothed and minutely hyaline. Corolla white, blue-purple outside, 5—7 mm. long, the tube very short, the lobes hairy. Bases of the filaments obovate, slightly ciliate. Ovary inferior, hemispherical. Valves shorter than the calyx lobes.

The type is *Adamson* 4844 (BOL).

Damp places in mountain kloofs near Riversdale.

A distinctive species readily known by the habit, hispid stems, flat spreading leaves and branched inflorescence. It bears some resemblance to *L. Thunbergiana* but is quite different in leaf, corolla, and ovary.

RIVERSDALE. Riversdale, *Muir* 2628 (PRE): Garcias Pass, *Adamson* 4844.

Ser. 9. **Thunbergianae** Adamson ser. nov.

Suffrutices. Folia plana reflexa. Inflorescentia ramosa, floribus solitariis. Corollae tubus lobis calycis aequilongus. Ovarium triloculare.

Shrublets. Leaves flat, rather thin, usually reflexed. Inflorescence branched. Corolla with a tube about as long as the calyx lobes. Ovary 3-chambered.

The type species is *L. Thunbergiana* Buek.

KEY TO THE SPECIES.

1. Stout, woody, gray-green: leaves with a thickened border, entire: inflorescence branches rigid: ovary half superior ..	*Thunbergiana*
1. Slender, green: leaves not bordered, toothed: inflorescence branches very slender: ovary inferior	*brachiata*

36. **L. Thunbergiana** Buek in E. & Z. Enum. 376. 1837. *L. anomala* A.DC. in DC. Prodr. 7. 418. 1839.

A diffuse or erect gray-green woody shrublet with lax ascending branches. Stems shortly hairy, 15—50 cm. high. Leaves alternate, not fasciculate, reflexed, flat, linear, 0·8—1·5 cm. long, 1—2 mm. wide, usually as long as or longer than the internodes, the edges thickened and entire or with very minute teeth. Inflorescence branched, the branches spreading or divaricate, rigid, ultimately spinous. Flowers solitary, on rigid pedicels 3—9 mm. long, longer than the small leaf-like bracts. Calyx lobes 2—3 mm. long, acute, slightly keeled, the edges revolute and toothed at the base. Corolla white, fading to yellowish, sometimes purple outside, 6—8 mm. long, the tube about 2 mm. long, the lobes slightly hairy on the mid line. Bases of the filaments oblong, subobtuse, often cucullate at the top, densely ciliate. Style coarsely hairy, thickened at the top. Ovary hairy, half-superior, the lower part less than 1 mm. long, bulged below the calyx lobes and retuse at the base. Fruit 2 mm. diam., the valves slightly shorter than the spreading calyx lobes.

The type is *Ecklon & Zeyher* 2359 in herb. Sonder (S); of *L. anomala* Drege 166b (G).

Among bushes or on rocks at the margins of the karroo.

A distinctive species of rather dry habitats, easily recognised by the scattered flat linear reflexed leaves, branching inflorescence and half superior ovary. Where growing among bushes the stems may be as much as 1·5 m. long. Flowers in spring, much earlier than most of the species.

NAMAQUALAND. Concordia, *Thorne* (NBG): Spektakel, *Compton* 11514 (NBG): O'Kiep, *Bolus* 486 (BM, BOL, K, G, SAM), 6520 (K): Brakdam, *Barker* 1195 (NBG): Wallekraal, *Pillans* 18138 (PRE), s.n. (BOL): Bowesdorp, *Stokoe* (PRE): Kamieskroon, *Adamson* 5052-3 (PRE): *L. Bolus* (BOL, K): *Compton* 6811 (NBG): Garies, *Acocks* 14925 (K, PRE): *Compton* 17181 (NBG): *Esterhuysen* 6435 (BOL): *Lewis* (SAM): *Levyns* 1130 (NBG), 4078 (CT): *Stokoe* (SAM): Kamiesberg, *Esterhuysen* 1350 (NBG): Leliefontein, *Drege* 166 (S), 166b (BM, G, K, S): without locality, *Ecklon & Zeyher* (SAM).

VAN RHYNSDORP. Van Rhynsdorp, *Kolbe* (BOL): Kareeberg, *Schlechter* 1122 (PRE), 8231 (BM, BOL, G, K, PRE): Giftberg, *Pearson* 6531 (BOL).

WORCESTER. Veld Reserve, *Acocks* 15246 (K, PRE): *Leighton* 1995 (PRE): Mowers Siding, *Acocks* 14543 (PRE): Matroosberg Stn., *Adamson* 5095.

MONTAGU. Koo, *Adamson* 5104: *Compton* 3888 (BOL): Montagu, *Adamson* 5112: *Levyns* 512 (CT).

LADISMITH. Ladismith, *Salter* 6327 (K).

HEIDELBERG. Barriedale, *Adamson* 5112: Warmwaterberg, *Adamson* 5126, 5130: Lemoenshoek, *Adamson* 5137.

RIVERSDALE. Gouritz River, *Ecklon & Zeyher* 2359 (G, S, SAM).

OUDTSHOORN. Oudtshoorn, *Bolus* (BOL).

GRAAFF-REINET. Graaff-Reinet, *Bolus* 15 (BOL).

MURRAYSBURG. Murraysburg, *Tyson* 322 (BM, BOL).

Without locality:—*Drege* 9139b (G).

37. **L. brachiata** Adamson sp. nov.

Procumbens ramosa. Folia alterna, lineari-oblonga denticulata reflexa inferiora congesta fasciculata, superiora distantia non fasciculata. Inflorescentia terminalis ramis filiformibus late dichotomis internodiis longis. Bracteae foliis similes reflexae. Corollae tubus lobis calycis aequilongus. Ovarium inferum hemisphericum vel turbinatum. Valvae lobis calycis breviores.

Stems slender, prostrate, 15—30 cm. long, with very slender erect branches, the upper parts and inflorescence zigzag with long internodes. Leaves alternate, linear-oblong, 5—8 mm. long, 1—2 mm. wide, reflexed, the margins very slightly revolute, with 2—3 pairs of sharp teeth in the lower half. Lower leaves crowded, fasciculate, the upper distant, solitary. Leaves on the side branches spreading. Inflorescence zigzag, with long slender internodes 1—1·5 cm. long, and divaricate or widely forking branches. Flowers solitary. Pedicels filiform, very shortly pubescent. Calyx lobes 3—4 mm. long, acute, obscurely denticulate. Corolla 1—1·4 cm. long, blue or violet, the tube as long as the calyx lobes. Bases of the filaments ovate-acuminate, less than 1 mm. long. Style glabrous, very slightly thickened at the top. Ovary inferior, hemispherical or turbinate. Valves half as long as the calyx lobes.

The type is *Pott* 4707 (PRE).

In the mist belt on mountains in the northern Transvaal.

A distinctive species somewhat isolated geographically from its allies.

PIETERSBURG. Haenertsberg, *Schlechter* 5477 (PRE): Woodbush, *Pott* 4707 (PRE).

Ser. 10. **Adpressae** Adamson ser. nov.

Suffrutices ramosi, ramis floriferis elongatis paucifoliatis. Folia rigida denticulata reflexa vel recurvata, in ramis floriferis perdistantia. Flores pedicellati solitarii. Corollae tubus saepe lobis calycis longior. Ovarium semi-inferum triloculare.

Glabrous woody shrublets with elongated flowering branches. Leaves rigid, denticulate, concave above, crowded below but very distant on the flowering branches. Flowers pedicellate. Corolla tube often longer than the calyx lobes. Ovary inferior or half-inferior, rounded below, 3-chambered.

The type species is *L. adpressa* A.DC.

Key to the Species.

1. Leaves not fasciculate: corolla tube longer than the calyx lobes.
    2. Leafy stems branched at the top only: flowering branches not divaricate .. .. *adpressa*
    2. Stems branched all along: flowering branches with divaricate branchlets, ultimately spinous .. .. *asparagoides*
1. Leaves fasciculate: corolla tube very short: branches divaricate, the flowering very numerous, very slender .. .. *effusa*

38. **L. adpressa** (Thb.) A.DC. Monog. Camp. 110. 1830. *Campanula adpressa* Thunb. Prod. Pl. Cap. 38. 1794. *Wahlenbergia adpressa* Sond. Fl. Cap. 3. 583. 1865.

An erect or sprawling woody shrublet, up to 60 cm. high. Stems several from the tap-root, stout, glabrous, branched at the top only. Leaves crowded on the main stem, scattered on the branches, squarrose or recurved but reflexed when old, glabrous, decurrent, rigid, 8—11 mm. long, 2 mm. wide, concave above, sharply toothed on the edges. Inflorescence a many-branched panicle, the main branches ascending, 5—30 cm. long, green, with scattered decurrent leaves 5—6 mm. long, the upper parts and secondary branches with minute leaves 1—2 mm. long. Calyx glabrous, the lobes 1—1·5 mm. long, acute, slightly incurved when young but revolute at the fruiting stage. Corolla white fading to yellowish, 6—7 mm. long, the tube 3 mm. long, about twice as long as the calyx lobes, the lobes spreading or recurved, parallel-sided, often with blue streaks on the back. Bases of the filaments oblong, acute, shortly but densely ciliate. Style slightly longer than the corolla, blue, thickened towards the top. Ovary half-inferior, hemispherical below, conical above, smooth, glabrous. Fruit about 2·5 mm. diameter, the valves obtuse, longer than the calyx lobes. Seeds ovoid-cylindrical, smooth, brown.

The type is in herb. *Thunberg*, Uppsala.

Sandy flats, especially near the sea, in the south-west.

In the later stages the leaves on the main stem dry up but those on the panicle and panicle branches remain green. Rather variable in size and in the number, length and division of the flowering branches.

Though originally placed in *Lightfootia* by A. De Candolle with a query, it is retained there on account of the habit, leaves, narrow corolla lobes, and long style. Its nearest allies certainly belong to the genus. Sonder transferred it to *Wahlenbergia* but it was not included by von Brehmer in his revision of the African species.

HOPEFIELD. Saldanha Bay, *Compton* 17888 (NBG): Hopefield, *Bachmann* 429 (BOL).

CAPE. Cape Flats, *Rehmann* 1945 (BM): Tygerberg, *Moss* 9060 (BM): Milnerton, *L. Bolus* (BOL, K): Lange Vallei, *Ecklon & Zeyher* (SAM): Hout Bay, *Compton* 14399 (BOL, NBG, PRE): Retreat, *Adamson* 5223:

Lewis (SAM): Muizenberg, *Salter* 2924 (BM, BOL, K): Zeekoe Vlei, *Salter* 3993 (BM, BOL, K).

WORCESTER. Uitkomst, *Zeyher* 1064 (BM, BOL, CGE, G, K, SAM).

Without locality:—*Ecklon & Zeyher* 2348 (SAM).

39. **L. asparagoides** Adamson sp. nov.

Suffrutex glabra ramosissima, ramis longis ultimis divaricatis tandem subspinescentibus. Folia nonfasciculata, alterna patentia vel recurvata. Flores pauci. Calycis lobi breves acuti corolla quadruplo breviores. Corollae tubus lobis calycis longior. Ovarium inferum turbinatum, valvis lobis calycis paulo brevioribus.

Sprawling. Stems green, many from a woody root, up to 1 m. long, much branched, the ultimate branchlets divaricate and finally more or less spinous. Leaves alternate, not fasciculate, the lower 2—4, rarely 5—7 mm. long, rigid, spreading or falcate-recurved, concave above, the edges thickened and obtusely toothed, the upper much smaller. Lower leaves as long as or longer than the internodes, the upper distant, often 1—1·5 cm. apart. Flowers at the tips of the branchlets: pedicels 2—3 mm. long. Calyx lobes 1—1·5 mm. long, acute or mucronate. Corolla white, glabrous, 5—7 mm. long, the tube 2·5—3 mm. long, almost as long as the lobes. Bases of the filaments elliptic-oblong, not bulged at the sides, acute, densely ciliate. Ovary inferior, hemispherical or slightly narrowed at the base. Valves slightly shorter than the reflexed calyx lobes.

The type is *Adamson* 5036 (BOL).

Sandy flats near the sea in Namaqualand.

Allied to *L. adpressa* but quite different in habit and inflorescence.

NAMAQUALAND. Witbank, *Pillans* 5344 (BOL, K): Hondeklip Bay, *Pillans* 18131 (PRE), s.n. (BOL): Wallekraal, *Adamson* 5036.

CLANWILLIAM. Ebenezer, *Drege* 6309 (BM, CGE, G, K, S): Flats, *Leipoldt* 4347 (BOL, K, PRE).

40. **L. effusa** Adamson sp. nov.

Suffrutex ramosissima, caulibus lignosis, ramis ultimis filiformibus. Folia alterna fasciculata reflexa linearia denticulata. Rami floriferi filiformes. Ovarium hemisphericum, valvis lobis calycis aequilongis.

Stems many from the root, woody, with divaricate branches. Leaves alternate, fasciculate, reflexed or recurved, linear, 8—11 mm. long, 1—2 mm. wide, concave above, toothed all along the edges. Flowering branches numerous, much branched, very slender, with small distant leaf-like bracts. Flowers small, distant, on pedicels 0·5—1·5 cm. long. Calyx lobes 1·5 mm. long, with an outturned mucro at the tip. Corolla white, 4 mm. long, the tube very short. Style distinctly thickened at the top.

Ovary inferior, glabrous, hemispherical. Fruit 1·5 mm. long: valves about as long as the spreading calyx lobes.

The type is *Levyns* 5516 (CT).

Kloofs at the foot of the Langeberg near Robertson.

In the fasciculate leaves and short corolla tube this approaches Series *Tenellae*.

ROBERTSON. Poesjanets River, *Levyns* 5516 (CT).

Ser. 11. **Rupestres** v. Brehm. l.c.

Tall herbs or sometimes woody. Leaves ovate-lanceolate, sessile. Flowers sessile or nearly so, in terminal groups or a compound spike or head. Ovary inferior, usually 3-chambered, hemispherical or turbinate, about as wide as long.

The type species is *L. glomerata* Engl.

KEY TO THE SPECIES.

1. Woody at the base: glabrous: leaves broad-based, clasping, decurrent: flowers spicate or paniculate .. .. .. *Huttonii*
1. Herbaceous: hispid: leaves spreading, narrowed to the base: flowers in a compound head or spike .. .. *glomerata*

41. **L. Huttonii** Sond. Fl. Cap. 3. 556. 1865. *L. corymbosa* O. Kuntze Rev. Gen. Pl. 3. 2. 188. 1893.

Stems erect, rigid, 20—50 cm. high, many from a woody base, either unbranched or branched at the top, densely covered with leaves. Leaves ascending, sessile, linear-lanceolate, 0·7—2·5 cm. long, 0·2—0·5 cm. wide, almost cordate at the base and clasping, entire, decurrent, the edges thickened and often ciliate. Inflorescence a compact terminal spike, a spicate panicle, or with ascending candelabra-like branches up to 10 cm. long. Flowers on very short erect pedicels. Calyx lobes 2—3·5 mm. long, acute, revolute at the edges. Corolla blue, mauve or purple, the tube 1—1·5 mm. long, the lobes narrow, 6—7 mm. long. Bases of the filaments narrow-oblong with obtuse projections at the top, densely ciliate. Ovary inferior, conical, 3-chambered. Fruit conical, the valves shorter than the calyx lobes.

The type is *Bowker* (Katberg) in herb. Sonder (S).

Grassveld and savannah in the eastern regions.

There is considerable variation in the inflorescence with all stages from an unbranched spike to a lax corymb with long branches. *L. corymbosa* is merely a form with a lax inflorescence. Robust forms may have leaves as much as 0·8 cm. wide.

CAPE:

FORT BEAUFORT. Katberg, *Bowker* (S): *Galpin* 2062 (PRE).

KEISKAMA. Keiskamahoek, *Story* 3325 (PRE).

STUTTERHEIM. Dohne, *Flanagan* 2283 (BOL, SAM).

CATHCART. Gaikakop, *Dyer* 1981 (PRE): *Schonland* 4467 (PRE): Toise River, *Flanagan* 2283 (K, PRE).

KENTANI. Kentani, *Pegler* 1081 (BM, BOL, K).

ENGCOBO. Engcobo Mt., *Flanagan* 2688 (PRE).

UMTATA. Barizaberg, *Baur* 596 (K, SAM).

O.F.S.:

HARRISMITH. Van Reenens Pass, *Penther* 2760 (BM): *Sankey* 148 (K): *Wood* 5726 (K).

NATAL:

ALFRED. Harding, *Ward* 167 (PRE).

UNDERBERG. Underberg, *McClean* 613 (PRE).

UMZINI. Dumissa, *Rudatis* 878 (BM, K).

DURBAN. Pinetown, *Wood* (PRE).

LION RIVER. Fields Hill, *Wood* 460 (BM), 1967 (K, SAM): Amaschanga, *Wood* 4599 (K).

KRANTZKOP, *O. Kuntze* (K).

WEENEN. Hlatikulu, *Acocks* 11375 (BM, PRE): Howick, *Wood* (G).

BERGVILLE. Drakensberg, *Evans, M. S.* 367 (K), 647 (K).

PIET RETIEF. Iswalpe, *Sidey* 1606 (PRE): Piet Retief, *Sidey* 2061 (PRE): s.l. *Gerrard* 748 (K).

TRANSVAAL:

WAKKERSTROOM. Vlakfontein, *Rogers* 11544 (PRE): Volks Hill, *Galpin* 9852 (PRE).

BARBERTON. Barberton, *Davison* 119 (PRE): *Galpin* 582 (BOL, K, PRE): 1038 (K, PRE): *Rogers* 24035 (K): *Thorncroft* 3121 (PRE): *Wood* 4288 (K).

NELSPRUIT. White River, *Hafstrom & Acock* 1475 (PRE): Nelshoogde, *Codd* 8155 (PRE).

PILGRIM'S REST. Mt. Andrews, *Smuts & Gillett* 2388 (PRE): Maucheberg, *Smuts & Gillett* 2336 (PRE).

LYDENBURG. Nelsberg, *Taylor* 1882 (PRE): Kemps Heights, *Codd* 8311 (PRE).

PIETERSBURG. Woodbush, *Mogg* 14669 (PRE): *Wager* (PRE).

SWAZILAND. Mbabane, *Bolus* 12096 (BOL, K), 12097 (BOL, K): *Compton* (K): Nottingham Road, *Saltmarshe* 1047 (BOL, PRE, SAM): Havelock Concession, *Galpin* 1047 (K, PRE): Forbes Reef, *Roberts* (PRE), s.l. *S. A. Stewart* (BM).

Without locality:—*Cooper* 2657 (K): *Mudd* (K).

42. **L. glomerata** Engl. Bot. Jahrb. 19. Beinl. 47. 52. 1894.

A stout hispid herb, 30—50 cm. high. Leaves oblong or oblong-lanceolate, spreading, 1·5—3·5 cm. long, 0·3—0·8 cm. wide, rather thin, the edges thickened and revolute. Flowers sessile in a compact spike-like head, either solitary or in groups, 1—3 cm. long, 1—1·5 cm. diameter. Bracts like small leaves, hispid, as long as the flowers. Calyx lobes hispid, 2—3 mm. long. Corolla blue or violet, 5—6 mm. long, the tube very short. Bases of the filaments rhombic with obtuse rounded angles. Ovary inferior, hemispherical, glabrous.

The type is *Holst* 3182 in herb. Berlin.

Throughout east Central Africa, doubtfully recorded in Zululand.

No specimens have been seen but *Wood* 928 and *Gerstner* s.n. are so named in the Natal herbarium.

Ser. 12. **Abyssinicae** Adamson nom. nov. *Laxiflorae* v. Brehm. l.c.

Tall herbs. Leaves oblong or lanceolate, numerous at the base, few small and distant above. Flowers pedicellate, in a lax panicle. Ovary inferior, 3-chambered.

Only local species *L. abyssinica.*

43. **L. abyssinica** Hochst. Flora 24. 1. 1841. Rich. Tent. Fl. Abyss. 2. 1. 1847.

A tall branched herb, 30—60 cm. high, usually hairy below, glabrous above. Leaves many near the base, few and small above: lower leaves oblong-lanceolate, 1·5—4·5 cm. long, 0·2—1 cm. wide, the edges thickened, slightly revolute, minutely toothed, more or less hispid below. Inflorescence elongated, simple or branched: flowers in groups in the axils of small bracts. Pedicels short or long, simple or branched. Calyx lobes 2 mm. long, acute, more or less revolute at the edges. Corolla 4—6 mm. long, white, mauve, blue or yellowish, the tube 1—1·5 mm. long. Ovary inferior, hemispherical. Fruit with valves shorter than the calyx lobes, much shorter than the lower part.

The type is *Schimper* 232.

Throughout Central Africa. In the Union confined to Zululand.

NATAL. Zululand, Ntuzini, *Wood* 11385 (BOL, SAM).

Seri. 13. **Marginatae** v. Brehm. l.c.

Tall herbs coarsely hairy. Leaves oblong-lanceolate. Flowers sessile in axillary groups or heads. Ovary inferior, 3-locular.

The type species is *L. marginata* A.DC.

44. **L. marginata** A.DC. Ann. Sc. Nat. Bot. 5. 6. 326. 1866.

A stout coarsely hairy herb up to 75 cm. high. Stems ridged. Leaves oblong-lanceolate, the lower 1—3 cm. long, 0·3—0·6 cm. wide, the upper smaller, all ascending, revolute at the edges and toothed. Flowers in sessile axillary groups in the axils of bracts like leaves but much smaller: groups opposite or alternate, close or distant. Flowers hispid. Calyx lobes revolute. Corolla blue, hairy outside, the tube short. Ovary inferior, slightly pointed at the base, with distinct longitudinal ridges.

The type is *Welwitsch* 1156 (K).

Found in S.W. Africa and Rhodesia but not so far recorded within the Union.

Section 2. **PHYTEUMOIDES** Adamson comb. nov. *Wahlenbergia* sect. *Phyteumoides* A.DC. in DC. Prod. 7. 441. 1839.

Virgate herbs with scattered leaves small and distant in the upper parts. Inflorescence lax, raceme-like, usually unbranched. Corolla 8 mm. or more long, with a tube as long as the calyx lobes. Ovary inferior, 2-chambered, obconical. Fruit elongated, cylindric-conical, thin-walled, the valves short.

Only series 14. **Juncea** v. Brehm. l.c.

The type species is *L. juncea* Sond.

KEY TO THE SPECIES.

1.	Leaves less than 2 cm. long: flowers sessile or nearly so ..	*juncea*
1.	Leaves over 2 cm. long: flowers on long pedicels	*laxiflora*

45. **L. juncea** (Buek) Sond. Fl. Cap. 3. 563. 1865. *Prismatocarpus junceus* Buek in E. & Z. Enum. 383. 1837. *Wahlenbergia spicata* E. Mey. ex A.DC. in DC. Prod. 7. 441. 1839.

A tall slender virgate herb. Stems many from a woody base, erect, up to 50 cm. high. Leaves alternate, close below, distant above, decreasing in size from the base upwards: lower leaves elliptic-lanceolate or oblong, up to 2 cm. long, 2—4 mm. wide, the upper much smaller. Leaves entire, with thickened revolute edges, slightly hispid below. Flowers in a lax raceme-like inflorescence, sessile or very shortly pedicellate, either solitary or in cymose groups in the axils of small bracts. Calyx lobes 2—3 mm. long, acute, ciliate, distinctly connate at the base, bending out abruptly at the top of the ovary. Corolla usually white, 0·8—1 cm. long, the tube as long as the calyx lobes. Bases of the filaments oblong, obtusely 3-lobed at the top, shortly but densely ciliate. Ovary inferior, 2-chambered, conical, 1·5—2 mm. long, with slender longitudinal ribs. Fruit 0·4—1 cm. long, cylindrical-conical, thin-walled, glabrous: valves short about half as long as the calyx lobes.

The type is *Ecklon & Zeyher* (Klipplaat River) in herb. Sonder (S).

Rocky places in the eastern grassveld.

ALBANY. Albany, *Bowker* (K).

FORT BEAUFORT. Kromie River, *Acocks* 11903 (PRE).

STUTTERHEIM. Dohne, *Acocks* 9198 (PRE).

KING WILLIAM'S TOWN. King William's Town, *Compton* 19339 (NBG): *Hutchinson* 1700 (K).

QUEENSTOWN. Queenstown, *Bolus* (BOL): *Galpin* 1670 (K, PRE): Shiloh, *Baur* 868 (K): Imvane, *Baur* 83 (K).

TARKA. Tarkastadt, *Acocks* 16283 (K, PRE).

XALANGA. Cala, *Pegler* 1667 (BOL).

ALIWAL NORTH. Jamestown, *Barker* 2113 (NBG): Elandshoek, *F. Bolus* 177 (K): *Bolus* 10525 (K).

GLEN GREY. Klipplaat River, *Ecklon & Zeyher* s.n. (S), 2400 (G, SAM).

GRAAFF-REINET. Sneeuwberg, *Bolus* 222 (BOL, SAM).

NATAL. Ladysmith, *Hill* (K).

Without locality:—*Barton* (Eastern Frontier) (K): *Cooper* 1808 (British Kaffraria) (K): *Drege* (BM, G, K).

46. **L. laxiflora** Sond. Fl. Cap. 3. 564. 1865.

Like *L. juncea* but more slender and more branched. Leaves linear, 5—6 cm. long, 1—2 mm. wide, rather crowded near the base, more distant above, the upper 1—1·3 cm. long and 1 mm. wide. Flowers in a lax, often secund, raceme-like group, on slender ascending pedicels 0·5—2 cm. long. Pedicels with 2 small bracts, occasionally with axillary flowers. Calyx lobes triangular, acute, 1—2 mm. long, ciliate, not obviously connate. Corolla 0·8—1·2 cm. long, the tube 0·3 cm. long, longer than the calyx lobes. Ovary narrow, 3—4 mm. long. Fruit as in *L. juncea* but up to 1·8 cm. long: valves obtuse, shorter than the calyx lobes.

The type is *Hutton* s.n. in herb. Sonder (S).

Rare on grassy mountain slopes in the eastern Cape Province.

Much like *L. juncea*, distinguished by the longer narrower leaves, the larger flowers on long pedicels, and the larger fruit.

SOMERSET EAST. Boschberg, *Bolus* 347 (BOL): *MacOwan* (BOL).

FORT BEAUFORT. Katberg, *Hutton* (S).

STUTTERHEIM. Stutterheim, *Sim* (K).

CATHCART. Kalogha Range, *Acocks* 9808 (PRE).

LIST OF NUMBERED SPECIMENS.

ACOCKS. 111 *nodosa:* 321 *nodosa;* 710 *denticulata;* 1576 *denticulata;* 1621 *nodosa;* 2166 *denticulata* v. *transvaalensis;* 9198 *juncea;* 9635 *nodosa;* 9808 *laxiflora;* 10858 *denticulata* v. *transvaalensis;* 11189 *albens;* 11375 *Huttonii;* 11900 *juncea;* 12474 *denticulata* v. *transvaalensis;* 12502 *denticulata;* 12518, 12584 *denticulata* v. *transvaalensis;* 12799 *denticulata;* 12812 *albens;* 13618 *divaricata;* 14543, 14925 *Thunbergiana;* 15195 *umbellata;* 15246 *Thunbergiana;* 15673 *albens;* 16283 *juncea.*

ADAMSON. 717 *longifolia;* 778 *subulata;* 836 *longifolia* v. *corymbosa;* 909 *longifolia;* 1261 *parvifolia;* 1363 *diffusa;* 1683-4 *tenuis;* 2334 *parvifolia;* 2336 *tenuis;* 2385 *subulata;* 2432 *oppositifolia;* 2461 *diffusa;* 3632 *oppositifolia;* 3789 *calcarea;* 3914 *cinerea;* 4043 *subulata;* 4105, 4126 *brachyphylla;* 4174 *axillaris;* 4210 *rubioides* v. *Stokoei:* 4326 *tenella;* 4331, 4333 *rubioides;* 4338 *fasciculata;* 4353 *cinerea;* 4360 *parvifolia;* 4361 *fasciculata;* 4370 *pauciflora;* 4375 *cinerea;* 4376 *unidentata;* 4377 *fasciculata;* 4437 *rubioides;* 4464 *oppositifolia;* 4469 *parvifolia;* 4698-9 *diffusa;* 4742 *subulata;* 4742A *subulata* v. *tenuifolia;* 4746 *subulata;* 4747-8 *oppositifolia;* 4750 *subulata* v. *tenuifolia;* 4759-60-1 *tenuis;* 4766 *diffusa;* 4768 *axillaris;* 4769 *rubens;* 4770 *cinerea;* 4771 *diffusa;* 4772 *subulata;* 4777 *cinerea;* 4779 *subulata;* 4787 *diffusa;* 4788-9-90 *calcarea;* 4792-3-4 *calcarea;* 4797-8-9 *rubens* v. *brachyphylla;* 4800-1 *rubens* v. *brachyphylla;* 4803 *cinerea;* 4805 *cinerea;* 4806 *rigida;* 4807-8 *cinerea;* 4811 *diffusa;* 4812 *subulata* v. *congesta;* 4814 *calcarea;* 4816 *diffusa;* 4818-9 *calcarea;* 4821-2 *diffusa* v. *palustris;* 4823 *nodosa;* 4824 *rubens;* 4825 *nodosa;* 4826-7 *rubens;* 4830 *cinerea;* 4832 *pauciflora;* 4836-7 *cinerea;* 4839 *fasciculata;* 4840 *unidentata;* 4841-2 *fasciculata;* 4843 *cinerea;* 4844 *planifolia;* 4845 *fasciculata;* 4846 *cinerea;* 4847 *multiflora;* 4849 *cinerea;* 4850 *multiflora;* 4851 *fasciculata;* 4853 *unidentata;* 4854 *fasciculata;* 4856 *stricta;* 4857 *fasciculata;* 4860-1 *divaricata;* 4862 *stricta;* 4863 *rubioides;* 4865 *stricta;* 4867 *stricta;* 4868 *fasciculata;* 4869 *unidentata;* 4870-1 *fasciculata;* 4873 *rubens;* 4875 *cinerea;* 4876 *rigida;* 4878-9 *cinerea;* 4881 *rigida;* 4882-3 *cinerea;* 4885 *rigida;* 4886 *cinerea;* 4888 *cinerea;* 4889 *tenella* v. *montana;* 4890, 4892, 4894, 4896 *subulata;* 4897 *oppositifolia;* 4903, 4906-7 *axillaris;* 4909-10 *rubioides;* 4911-2 *subulata* v. *tenuifolia;* 4913 *brachyphylla;* 4915 *rubioides;* 4916-7, 4919 *brachyphylla;* 4920 *rubioides;* 4926 *parvifolia;* 4927 *tenuis;* 5036 *asparagoides;* 5052-3 *Thunbergiana;* 5095 *Thunbergiana;* 5101 *rigida;* 5104, 5112, 5126, 5130, 5137 *Thunbergiana;* 5161 *albens;* 5169 *rigida;* 5170 *tenella;* 5172, 5174-5-6 *rubens;* 5182 *cinerea;* 5184-5 *diffusa;* 5186 *rubens;* 5186A *diffusa;* 5187 *tenella;* 5190-1-2 *rubens;* 5193 *rigida;* 5194 *tenella;* 5200, 5202 *cinerea;* 5213, 5215-6-7-8-9-20 *nodosa;* 5221 *diffusa;* 5223 *adpressa;* 5225 *diffusa;* 5227 *longifolia;* 5232-3 *brachyphylla;* 5276 *unidentata;* 5284 *nodosa.*

ANDREAE. 1320 *nodosa.*

BARKER. 1195 *Thunbergiana;* 2113 *juncea;* 2150 *albens;* 4007 *longifolia;* 7193 *subulata;* 7224 *calcarea.*

BARNARD. 398 *denticulata* v. *transvaalensis.*

BAUR. 83 *juncea;* 596 *Huttonii;* 868 *juncea;* 991 *nodosa;* 1107 *albens.*

BOLUS. 9 *nodosa, rigida & tenella;* 15 *diffusa & nodosa;* 86 *albens;* 222 *juncea;* 347 *laxiflora;* 486 *Thunbergiana;* 750 *subulata;* 1078 *rubioides;* 1098 *rubens;* 1196 *abyssinica;* 2377 *divaricata* v. *debilis;* 2378 *unidentata;* 2379 *cinerea;* 2534 *denticulata;* 3275 *subulata;* 3880 *parvifolia;* 4162, 4164 *subulata;* 4165 *longifolia;* 5100 *rubioides;* 6520 *Thunbergiana;* 6950 *rubioides;* 7291 *diffusa;* 7404 *unidentata;* 8070 *cinerea;* 8568 *axillaris;* 8569 *calcarea;* 8664 *unidentata;* 8665 *divaricata & rubens;* 9114 *rubens;* 9140 *divaricata* v. *debilis;* 9350 *subulata;* 9408 *namaquana;* 10523 *albens;* 10525 *juncea;* 10892 *denticulata* v. *transvaalensis;* 11326 *diffusa & tenella;* 11585 *tenella;* 11586 *rigida;* 12096-7 *Huttonii;* 13314 *unidentata;* 13318 *denticulata* v. *transvaalensis;* 13814 *albens.*

F. BOLUS. 177 *juncea;* 6456 *denticulata.*

BOND. 118 *diffusa;* 250 *nodosa;* 1420 *spicata;* 1445 *rubioides.*

BOWIE. 2 *diffusa* v. *palustris;* 11 *cinerea.*

BRIERLEY. 209 *albens.*

BRUECKNER. 454 *denticulata*; 698 *albens*; 860 *nodosa*; 1058 *nodosa*.

BRYANT. D. 177 *caledonica*.

BRYNARD. 303 *nodosa*; 6152 *albens*.

BURCHELL. 9 *subulata*; 177 *longifolia*; 284 *subulata*; 606 *oppositifolia*; 631A *fasciculata*; 722 *longifolia*; 1381 *nodosa*; 1575 *nodosa*; 1886 *nodosa*; 2000 *denticulata*; 2002 *denticulata*; 2302 *denticulata*; 2675 *nodosa*; 2692 *albens*; 2709, 2712 *nodosa*; 2720 *albens*; 2849 *subulata*; 3506 *divaricata*; 4583 *divaricata* v. *debilis*; 4682 *cinerea*; 4794 *rubens*; 4870 *divaricata* v. *debilis*; 4933 *rubens*; 6398 *diffusa, rigida & tenella*; 6736 *unidentata*; 6857 *unidentata*; 7845 *rigida*; 7849 *diffusa* v. *Stokoei*; 7903 *subulata*; 8164 *rubioides*; 8634 *diffusa* v. *Stokoei*.

BURKE & ZEYHER. 1064 *caledonica*; 1067 *paniculata*.

BURTT-DAVY. 989 *paniculata*; 10136 *denticulata*; 11023 *denticulata*; 11327 *denticulata*; 12007 *rubens*; 12942 *denticulata*; 14377 *denticulata*; 14480 *denticulata*; 14649 *denticulata* v. *transvaalensis*.

CODD. 2590 *denticulata* v. *transvaalensis*; 2688 *paniculata*; 6479 *paniculata*; 7910 *paniculata*; 8158 *Huttonii*; 8311 *Huttonii*.

CODD & DE WINTER. 4965 *denticulata* v. *transvaalensis*.

COLLETT. 469 *albens*.

COMERS. 709 *divaricata*; 718 *nodosa*; 719 *albens*.

COMPTON. 2650, 2653-4 *nodosa*; 2765 *rigida*; 2785 *nodosa*; 2998 *divaricata*; 3380 *subulata*; 3848 *rigida*; 3868 *Thunbergiana*; 4853 *subulata*; 5216 *rubens*; 5220 *cinerea*; 6065 *longifolia*; 6358 *diffusa*; 6811 *Thunbergiana*; 6859 *parvifolia*; 7199 *cinerea*; 7953 *nodosa*; 8430 *rubioides*; 8579 *diffusa* v. *palustris*; 8608 *rubens*; 8329 *nodosa*; 9946 *nodosa*; 10119 *longifolia*; 10275 *tenella*; 10318 *parvifolia*; 10550 *cordata*; 10619 *diffusa*; 11514 *Thunbergiana*; 12194 *nodosa*; 12330 *subulata*; 12517, 12578 *diffusa*; 12595 *subulata*; 12796 *diffusa*; 14265 *subulata*; 14349 *divaricata*; 14399 *adpressa*; 15506 *unidentata*; 15682 *albens*; 16587 *subulata*; 16615 *longifolia*; 16896 *rubioides*; 16947 *oppositifolia*; 17181 *Thunbergiana*; 17888 *adpressa*; 17927 *longifolia*; 18280 *nodosa*; 18581 *diffusa*; 19339 *juncea*; 19490 *nodosa*; 19521 *divaricata*; 19662 *albens*; 19668, 19671 *divaricata*; 21167 *nodosa*; 21187 *longifolia*; 21471 *parvifolia*; 21642 *albens*; 21859 *diffusa*; 21918 *rubioides*; 22152 *calcarea*; 22702 *longifolia*; 23545 *divaricata*.

CONNELL. 37 *denticulata*.

COOPER. 654 *albens*; 774 *albens*; 1808 *juncea*; 2657 *Huttonii*; 2674 *denticulata*.

CROSS. 50 *diffusa & nodosa*.

DALY & SOLE. 360 *nodosa*.

DAVISON. 119 *Huttonii*.

DIETERLEN. 332 *denticulata*; 402 *albens*; 528 *caledonica*; 1196 *albens*; 1292 *denticulata*; 6980 *caledonica*.

DINTER. 1471, 3497, 6068 *intricata*.

DIX. 88 *divaricata*.

DREGE. 166, 166b *Thunbergiana*; 4005 *denticulata*; 6294 *divaricata*; 6300 *denticulata*; 6306 *parvifolia*; 6308 *nodosa*; 6309 *asparagoides*; 6311 *divaricata*; 6312 *subulata*; 6314 *oppositifolia & spicata*; 6315 *parvifolia & spicata*; 6316 *tenella & divaricata* v. *debilis*; 6317 *divaricata*; 6317a *albens & nodosa*; 6317b *divaricata*; 6318 *rigida*; 6319 *albens*; 6320 *rubens*; 7496 *divaricata*; 9138 *rubens*; 9139b *Thunbergiana*.

DUTHIE. 813 *fasciculata*; 814 *divaricata*; 915 *divaricata* v. *debilis*.

DYER. 1450 *diffusa*; 1909 *albens*; 1981 *Huttonii*; 2206 *albens*.

ECKLON. 1 *subulata*; 78 *longifolia*; 151 *parvifolia*; 156 *diffusa*; 280 *subulata*; 2350 *cinerea*; 2363 *divaricata* v. *debilis*.

ECKLON & ZEYHER. 2·11 *nodosa*; 15·3 *divaricata*; 54 *divaricata*; 70 *divaricata*; 94·12 *tenella*; 151 *parvifolia*; 2313 *divaricata* v. *debilis*; 2340 *subulata*; 2341 *longifolia*; 2342 *denticulata & oppositifolia*; 2343 *divaricata*; 2344-5 *divaricata*; 2346 *rubens*; 2347 *cinerea*; 2348 *adpressa*; 2349 *spicata*; 2350 *albens*; 2351-2 *divaricata*; 2353 *divaricata & divaricata* v. *debilis*; 2354-5 *diffusa*; 2356 *tenella*; 2357 *diffusa*; 2357a *nodosa*; 2358 *nodosa*; 2359 *Thunbergiana*; 2360 *parvifolia*; 2361-2 *oppositifolia*; 2363 *divaricata*; 2366 *parvifolia*; 2378 *denticulata*; 2400 *juncea*.

ESTERHUYSEN. 1350 *Thunbergiana*; 1473 *rubioides*; 1840 *cordata*; 2059 *denticulata*; 2373 *nodosa*; 3081 *subulata*; 3653 *nodosa*; 4056 *longifolia*; 4200 *rubioides*; 4424 *calcarea*; 4441 *diffusa*; 4514 *cordata*; 4732-3 *cordata*; 4926 *axillaris*; 4973 *axillaris*; 6274 *rigida*; 6435 *Thunbergiana*; 6480 *tenella*; 6613 *divaricata* v. *debilis*; 6667 *rigida*; 6691 *tenella*; 6897 *divaricata* v. *debilis*; 7427 *multicaulis*; 7707

oppositifolia; 8575 *rubioides;* 8793 *parvifolia;* 9795 *parvifolia;* 9951 *spicata;* 10052 *parvifolia;* 10060 *oppositifolia;* 10618 *divaricata* v. *debilis;* 10648 *rigida;* 10668 *divaricata* v. *debilis;* 10756 *rigida;* 10795 *rigida;* 10911 *rigida;* 11450 *parvifolia;* 12257 *spicata;* 12336 *subulata;* 12470 *subulata;* 12566 *oppositifolia;* 12580 *axillaris;* 12626 *subulata;* 13316 *fasciculata;* 13320 *subulata;* 13418, 13420 *rubioides;* 13675 *cinerea;* 13703 *axillaris;* 13718 *subulata;* 13821 *rubioides;* 14301 *rubioides;* 15014 *multicaulis;* 16488 *tenella;* 16619 *spicata;* 16792 *rubens;* 17210 *unidentata:* 19229 *fasciculata;* 17237 *tenella;* 17238 *diffusa* v. *palustris;* 17767 *spicata;* 18420 *cordata;* 19096 *calcarea;* 19505 *tenella;* 19567 *calcarea;* 21106 *oppositifolia;* 21139 *multicaulis;* 22018 *subulata;* 22073 *spicata.*
EVANS. 367 *Huttonii;* 647 *Huttonii.*
FAIRALL. 1607 *paniculata.*
FAWKES. 127 *caledonica.*
FINE. G 109 *tenella.*
FLANAGAN. 1361 *albens;* 1465 *nodosa;* 1477 *denticulata;* 1500 *cinerea;* 2283 *Huttonii;* 2688 *Huttonii;* 2961 *denticulata* v. *transvaalensis;* 3079 *albens.*
FOLEY. 180 *nodosa;* 2781 *denticulata.*
FORBES. 20 *divaricata.*
FOURCADE. 114 *divaricata* v. *debilis;* 184 *fasciculata;* 603 *cinerea;* 1082 *unidentata;* 1124 *divaricata;* 1124a *divaricata* v. *debilis;* 1149 *cinerea;* 1157 *unidentata;* 1347 *rubens;* 1467 *fasciculata;* 2076 *cinerea;* 2430a *unidentata;* 2899 *rubens;* 3030 *rigida;* 3911 *stricta;* 5071 *rigida;* 5519 *unidentata;* 5918 *rubens;* 6242 *tenella;* 6380 *fasciculata;* 6484, 6520 *divaricata.*
GALPIN. 198 *albens;* 199 *diffusa;* 582, 1038, 1047 *Huttonii;* 1381 *axillaris;* 1670 *juncea;* 1791 *diffusa;* 2011 *albens;* 2062 *Huttonii;* 2222 *albens;* 4304 *tenella;* 4306 *diffusa;* 4307 *subulata;* 4969 *albens;* 6273, 6371-2 *divaricata;* 7145 *caledonica;* 8951 *rubens;* 9020 *denticulata;* 9852 *Huttonii;* 11269 *axillaris;* 11469 *divaricata;* 12449 *subulata;* 12554 *parvifolia;* 12768, 12912-3 *longifolia;* 13276 *paniculata.*
GARSIDE. 678 *subulata.*
GEMMELL. 5814 *caledonica.*
GERRARD. 748 *Huttonii;* 1501 *denticulata* v. *transvaalensis.*
GERSTNER. 142 *albens;* 260 *denticulata.*
GILL. 78 *nodosa.*
GILLETT. 525 *rubioides;* 743 *rubioides;* 753 *subulata* v. *tenuifolia;* 774, 878 *parvifolia;* 882 *cinerea;* 1512 *longifolia;* 5254 *subulata.*
GLASS. 725 *divaricata* v. *debilis.*
GUILLERMOD. 372 *nodosa;* 529 *albens;* 894 *albens;* 1190 *albens.*
GUTHRIE. 9 *unidentata;* 754 *longifolia;* 1150 *subulata;* 1348 *diffusa;* 1429 *parvifolia;* 2274 *parvifolia;* 4341 *rubens;* 4346 *unidentata;* 4459 *albens;* 4481 *calcarea.*
HAFSTROM & ACOCK. 1475 *Huttonii;* 1476 *cinerea;* 1478 *rubioides;* 1988 *cinerea;* 2008 *calcarea.*
HARVEY. 55 *albens;* 260 *parvifolia;* 438, 458 *longifolia;* 470, 475 *subulata;* 490 *subulata;* 500 *longifolia;* 501 *parvifolia;* 1008 *nodosa;* 12117-8 *oppositifolia;* 12121 *parvifolia.*
HENDERSON. 2330 *rubioides.*
HENRICI. 177 *denticulata;* 1868 *albens;* 2571 *denticulata;* 2901-2 *nodosa;* 2947 *nodosa;* 4751 *nodosa.*
HEPBURN. 201 *albens.*
HUTCHINSON. 1272 *fasciculata;* 1588 *denticulata;* 1596 *nodosa;* 3000 *nodosa;* 3079 *albens.*
HUTCHINSON & DYER. 1700 *juncea.*
HUTTON. 881 *caledonica.*
JUNOD. 1066 *paniculata.*
KEET. 677 *fasciculata;* 957 *fasciculata.*
KIES. 221 *denticulata.*
KRAUSS. 102 *denticulata;* 103 *denticulata* v. *transvaalensis.*
LEEMANN. 66 *paniculata;* 101 *paniculata.*
LIEBENBERG. 3004 *denticulata.*
LEIGHTON. 922 *rubioides;* 1130 *Thunbergiana;* 1995 *Thunbergiana;* 2449 *longifolia.*
LEIPOLD. 3708 *subulata & subulata* v. *tenuifolia;* 4347 *asparagoides.*

LEVYNS. 512 *Thunbergiana;* 1130 *Thunbergiana;* 2069 *diffusa;* 2867 *tenella;* 3557 *subulata;* 4078 *Thunbergiana;* 5115 *rigida;* 5341 *rubioides;* 5374 *axillaris;* 5516 *effusa;* 5612 *longifolia;* 5615 *tenuis;* 5626 *tenuis;* 5632 *longifolia* v. *corymbosa;* 7821 *divaricata;* 8805 *axillaris;* 8822 *squarrosa.*

LIENDERTZ. 581 *denticulata* v. *transvaalensis.*

LONG. 800 *nodosa;* 1235 *divaricata & rubens.*

LOUW. 1094 *denticulata;* 1300 *caledonica;* 1327 *denticulata* v. *transvaalensis.*

LYNES. Z. 671. G. *albens;* Z. 671 a.r. *divaricata;* 1442 *albens.*

McCLEAN. 613 *Huttonii.*

MacGILLIVRAY. 611 *parvifolia;* 640 *subulata.*

MacOWAN. 181 *divaricata* v. *debilis;* 750 *subulata;* 953 *nodosa;* 1101 *divaricata* v *debilis;* 1133 *nodosa;* 1429 *laxiflora;* 1500 *cinerea;* 1504 *divaricata* v. *debilis;* 2080 *cinerea.*

MAGUIRE. 834 *microphylla;* 1082 *subulata;* 1231 *subulata.*

MARAIS. 231 *denticulata.*

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